THE

Journal of the American Medical Association.

EDITED FOR THE ASSOCIATION BY N. S. DAVIS.

PUBLISHED WEEKLY.

Vol. VI. CHICAGO, MAY 15, 1886. No. 20.

ADDRESS IN MEDICINE.

SOME POINTS IN BACTERIOLOGY.[1]

BY JAMES T. WHITTAKER, M.D.,

OF CINCINNATI.

PROFESSOR OF THEORY AND PRACTICE OF MEDICINE, MEDICAL COLLEGE OF OHIO.

"*Vere scire est per causas scire.*"
—BACON.

There are three planes in the history of medicine. The first is the study of the symptoms or appearance of disease. It is the period of the infancy of medicine. It is naturally the most crude period, and all irregular medicine still rests upon this plane. It gave us a pharmacopœia, and the highest expression of it made of the practice of medicine an art. The second plane begins with the observation of the effects or lesions of disease. It made us familiar with the natural history of disease, and thereby nearly destroyed the pharmacopœia. The third is the present plane, upon which are being prosecuted investigations into the cause of disease. Investigators have just set foot upon its threshold. When it shall have been fully attained medicine will be entitled to a place among the sciences which are called exact.

The progress made in this direction during the past year so completely overshadows all other work in range and promise of practical value as to justify in this report, to the exclusion of everything else, a brief review of the conclusions reached.

The etiology of acute infections is comprised under the single term, *bacteriology*, the bacterium having come in the course of time to include all pathogenic as well as many innocent micro-organisms.

The year just passed has not been as eventful in the definite discovery of new causes of disease as several that have preceded it in the first half of the present decade. What has especially characterized the past year is the fixation of facts previously acquired, whereby the so-called germ theory of infectious disease has been brought from the realms of the ideal to the region of the real. Coemans said several years ago, "the following up of a single bacterium through all its phases of development is far more valuable than the discovery of new germs," and this pursuit has now been made with such success in the case of many forms as to justify in our day the claim of Magni in the Roman Annals of Public Medicine, fifteen years ago, that the study of medicine should undergo a reform, making obligatory at least a three months' course with micro-organisms.

For it is now demonstrated beyond dispute that pathogenic micro-organisms do exist in distinct and definite entity. The views advanced by Beale, that bacteria are portions of diseased protoplasm from living tissues, and by Wigand, that they may spring up *de novo* in organic matter by transformation of organic molecules, are no longer held worthy of serious consideration. The view of Beale was never anything more than an ingenious hypothesis, and it fell to the ground with the first studies of the life history of bacteria, while Wigand's theory had no better support than any other *spontaneous generation*. The fate which so quickly overtook the illustration of this theory may well serve to show the danger of advocating spontaneous generation in our day.

Wigand remarked that for the purpose of dissipating all doubts concerning the spontaneous development of bacteria in the protoplasm of cells, he would call attention to the fact that moving bacteria could be seen at any time in the healthy living cells of the trianea bogotensis, and in the hairs of the labiatæ. This statement was brought to the notice of the eminent botanist of Strasburg, de Bary, who thus describes his investigations: The trianea is a South American floating water plant. A piece of its living tissue removed from a fresh, healthy plant, examined under the microscope, reveals in fact the most exquisite picture of bacteria. Slender bacilli, alone or adherent in short rows, follow about the movements of the protoplasm and other contents of the cell in the liveliest way. Such a picture is a model—as a picture. But the addition of a drop of dilute nitric acid quickly dispels the illusion. Instead of maintaining itself like a true micro-organism, the bacteria of the trianea are dissolved away at once. The same is true of the rods in the hairs of the lip-flowering plants. The "bacteria" are nothing else than small crystals of oxalate of lime frequent in this form in the cells of plants. This story is instructive, the author says, in showing how far astray preconceptions may lead otherwise excellent observers.

Wigand saw micro-organisms develop in fluids after exposure to boiling heat for half an hour, a temperature and time sufficient, he thought, to destroy all germs. But the experiments at Koch's laboratory at Berlin prove that individual spores resist a boiling heat for several hours. Wigand's erroneous conclusions were based upon an imperfect sterilization.

[1] The Address of the Chairman of the Section of Practice of Medicine, Materia Medica and Physiology, at the Thirty-Seventh Annual Meeting of the American Medical Association, St. Louis, May 5, 1886.

What a contrast to these obscure conceptions is offered in the clear statements of Leeuwenhoek, the first individual to turn the lens, crude and imperfect as it then was, upon, and to discover, micro-organisms. It would almost seem as if great minds knew intuitively what is true and what is false, else how may we understand the observation made by Leeuwenhoek as early as 1685 of the minute organisms found in water: "they do not arise in the water," he says, "they develop from germs."

The germ theory of disease was never really in so much danger from its enemies as its friends. For many years it suffered ridicule and discredit because of the false conceptions of "undismayed pioneers" and over-zealous advocates. The Germans still speak of the "überreifer Eifer" of this class. Thus the choleraphyton proclaimed in England, and later again in Germany, turned out to be nothing else than eggs of intestinal worms; the animalculæ of variola eventuated in the common bacteria of putrefaction, and the palmellæ of malaria disclosed by one of our countrymen were unmasked as foreign bodies, impurities, not even germs.

Claims of Convertibility of all Germs.—An original conception of this over-ripe zeal was the view of Hallier, that all kinds of germs, big and little, moulds, ferments, bacteria, are mutually convertible. Micrococci, said Zürn, are only stages of development of moulds. This view needed only the most accurate observations of Brefeld and de Bary to be entirely refuted. More serious was the claim of Grawitz that innocent mould fungi, aspergillus, mucor, etc., could be converted into dangerous forms. Grawitz saw that the injection of aspergillus into the blood of rabbits remained without effect, whereupon it occurred to him to change its natural, cool, acid soil to a warm alkaline soil with a view of changing its form and action. Such general permeation of various internal organs, especially the kidneys, followed these experiments, as to seem to have demonstrated the conversion of the innocent into a dangerous parasite.

But when Koch and Gaffky came to repeat these experiments, with the precautions implied in control observations, it was soon discovered that the species of aspergillus, mucor, etc., included a whole series of pathogenic germs, some of which had entered with the injection of innocent forms. Grawitz's erroneous conclusions were based upon the use of impure cultures.

The field had now become limited to the bacteria proper. It may be said at once that all practical interest hinges upon the question of the constancy or inconstancy, *mutability or immutability*, of the forms of pathogenic micro-organisms. If they are not specifically different, as Nägeli claimed, but are forms of one or a few species, so that the same species, by assuming different forms, may, in the course of years or decades, effect at one time the souring of milk, the ageing of wine, putrefaction, the decomposition of urea, the red coloration of starchy food, and at other times produce typhus, malarial or relapsing fevers, diphtheria and cholera—if such mutability of form and action exists as this; if the myriad micro-organisms of the earth and air may at any time assume deadly properties—all effort at investigation is futile, if not foolish, and every effort at destruction is not only powerless but paralyzed.

This idea of the unity of species, first advocated in our day by Ray Lancaster, met with warm advocacy at the hands of Billroth, who derived the different forms from variations in the soil or substratum, and later of Warming, who considered the different forms as so many different stages of development of the same species, like, to use a coarse comparison, the different stages of development of tapeworms in different hosts. Klebs was also inclined to accept this view, though with the reservation that certain forms occur preferably in the form of bacilli, others of micrococci.

Hay and Milzbrand Bacillus.—Perhaps no single statement seemed to lend such support to the negation of species as the claim of Buchner to be able to transform the innocent bacillus of hay infusion into the deadly organism of milzbrand. Buchner observed under continued cultivation the gradual change of the hay bacillus into the milzbrand bacillus, and with the reversal of this change, which he was likewise able to produce, maintained that the loss of virulence of the milzbrand bacillus was not an attenuation, as Pasteur had claimed, but a veritable transformation. Buchner was sufficiently well acquainted with the gross differences of the two bacilli, but he regarded them as accommodations of the same form to different soils. Hueppe credits Buchner also with a knowledge of the spore formation of the two bacilli —the most distinctive characteristic of different forms —which Buchner considered identical, a consideration which misled Brefeld to adopt Buchner's conclusions, but de Bary insists that with the gross differences in the spore formation of the two bacilli, it is doubtful if Buchner ever really studied the hay bacillus in this essential particular.

At any rate, it was easy for Koch, by pointing out these differences, as well as the difference in the resistance of the spores, the difference in the optimum and minimum temperatures in the process of reproduction, etc., to prove that Buchner was experimenting with two distinct species or forms, and that the apparent transformation was really a case of substitution or displacement of one form by the other. Inasmuch as no one has since succeeded in effecting such a transformation, this question may be regarded as definitely settled. Final disproof of Buchner's claim was made by Prazmowski in 1884, with the exhibition of such distinct differences in the two forms as to demonstrate their independence, so that whatever dispute remained concerned simply the possibility of attenuating the bacilli of milzbrand, a subject to be noticed again.

Bacteria of Milk.—A much more simple and easily refuted illustration of the inconstancy of action of micro-organisms was the observation of Nägeli, that fresh milk on standing becomes sour but boiled milk bitter. Fresh milk becomes sour, Nägeli says, under the action of a certain bacterium. Boiling the milk changes the character of the soil and the action of the same germ. Here, then, is an everyday observation of the transformation of the same micro-organism.

That this illustration may not seem too trivial, it may be said that it was, up to the time of Buchner's experiments, just mentioned, the sole apparently indisputable proof of the change of one definite ferment into another.

The fallacy of it became obvious when it was discovered that milk is made sour by many causes, among others, by many varieties of bacteria, of which Nägeli assumed the existence of but one. It did not occur to him to inquire if one variety might not get the upper hand before, another after boiling. The truth turned out even more simple than this, for Hueppe showed that of the many forms of micro-organisms present in milk, one, the micrococcus lacticus, exuberates in a low temperature, and renders milk sour by the formation of lactic acid. Boiling kills this micro-organism with many others, but the spores of the butyric acid germ, the bacillus amylobacter, also present, survive boiling heat to develop later into the mature form. This bacillus effects in boiled milk a decomposition of the albuminates, attended with a bitter taste. Neither form nor action has been changed in a single germ.

Deviations that do Occur.—But the strongest advocates of constancy of form and function, Cohn and Koch, do not maintain that certain deviations may not occur. They claim only that these deviations occur within certain limits, such limits as are to be observed in structures higher in the vegetable scale. Gardeners, florists, farmers, succeed in effecting, under varying surroundings, marked variations from he primitive plant, but they may never change an apple to a pear tree, wheat into rye, or a sunflower to a rose. Koch himself admits the possibility of changing one form of micro-organism to a nearly allied form. He goes so far as to say that it is not without the bounds of possibility to convert a pathogenic into an innocent form. What he asks is simply that the specificness of one form shall not be surrendered until the proof is furnished. There are monomorphous and pleomorphous bacteria. No one claims that every micro-organism shows itself under all circumstances in but one form, as Koch admits the occurrence of Finkler's vibrio in three forms, the curved rod, the lemon shape and the spirilla, but he still insists that the individual preserves the reproductive form of its cells, that is, that it appears as a micrococcus, a bacillus or a spirilla, and that it does not change these forms. For, as Mittenzweig maintains, it has never yet been shown that a bacterium appears at one time as a genuine micrococcus, at another as a genuine bacillus, and again as a genuine spirilla, and even if we admit the form changes which Buchner and Gruber have observed in the organism of Finkler, and Babes has observed in the cholera germ, we must also admit, as Buchner has himself observed, that in the cultivation of the different forms the typical curved rod invariably appears, so that all these secondary changes are to be looked upon simply as so many variations upon the typical form. With the experience of the botanist and florist cited, it is not a matter of surprise that micro-organisms have been seen to undergo changes of form which are not observed in nature. Attenuations of virulence, for instance, in virulent germs never occur spontaneously.

The Germ, not the Form, Essential.—The conclusion reached by the mycologists of the present day is that under natural circumstances micro-organisms show themselves in the rule, not with variations but in permanent forms, but that disease is not produced so much by a distinct and definite form as by a distinct and definite germ. Most of the diseases of plants, de Bary says, are produced by parasites, and as investigations develop more and more distinct species it is seen that definite diseases are produced by definite parasites, whose specific properties are no more to be doubted than those of higher organisms or worms. This claim, the author concludes, is not simply convenient, as Nägeli observes, it is the only view which is consistent with acquired facts.

Ubiquitous and Indigenous Germs.—The world of micro-organic life falls naturally into two great divisions. One is found everywhere, at all times and in all places, and, as has been shown, in abundance enough to realize the panspermatism of the ancients. Such germs are known as omnipresent, or, from the fact of their ability to obtain sustenance everywhere, as omnivorous germs. Hallier proposed to call them cosmopolitan, but Cohn devised the best appelative when he spoke of them as ubiquitous. Myriads of these germs are entirely innocent to man. Others are injurious only under certain circumstances. Thus the ubiquitous germs of common putrefaction may penetrate the body from a slough or a gangrenous part, to produce by their presence, or the chemical changes they induce, the condition known as septicæmia. Thus the pus-producing micro-organisms, probably of many kinds, belong to the class of ubiquitous germs.

On the other hand, most pathogenic micro-organisms are indigenous to certain definite places. These are the epidemic germs. Thus the mouths of the Ganges and Brahmaputra are the centres of cholera, Lower Egypt of the plague, the Antilles of yellow fever, Ireland of typhus. But just as plants of higher organization may be transplanted to other soils, may original endemics assume epidemic and finally pandemic proportions or extent. Thus small-pox first showed itself in Germany in 1493, an importation from the Netherlands, but it was not until 1527 that it was transported to our continent, making its appearance with wholesale slaughter in Mexico, and gradually extending thence over the whole of North America. Scarlet fever, which was first heard of in Arabia, was not seen in our country until 1735. It reached Iceland in 1827, South America in 1829, Greenland in 1847, and Australia in 1848. Measles had not been carried to Australia up to the beginning of our own decade. Cerebro-spinal meningitis, in all respects the most irregular of all epidemic diseases, first sprang up in Geneva, and first fell upon our country in 1806. Cholera was unknown with us until the memorable year of 1832. Even tuberculosis, which has long since assumed pandemic extent, was, as Liebermeister has shown, not originally ubiquitous, as it remained unknown to our own Indians, to the aborigines of Australia and the negroes of Central Africa until carried to them by more civilized races. There is therefore no longer question of the

spontaneous, or so-called autocthonous, origin of infection. Typhoid and typhus fevers, dysentery and diphtheria, pyæmia, erysipelas and puerperal fever, appear only at times when lurking germs and spores from previous cases find favorable conditions for development, or after fresh importations of the disease. All this disease, all infectious disease, is of exclusively parental birth, and can no more originate spontaneously than can serpents and crocodiles originate from heat and mud, as Lepidus maintained, bees be produced from the putrefying entrails of steers, as Virgil described, or mice be generated from sawdust and old shirts, as Van Helmont claimed. In keeping with these theories were the views since maintained that the plague arose from the putrefaction of corpses, yellow fever from the crowding of slave ships, cholera from decaying vegetable food, typhoid fever from the emanations of human excrement, consumption from bad ventilation, or oftener from a bad cold, and diphtheria from sewer gas. These are factors which do undoubtedly favor the spread of the infectious maladies, but never originate the birth of one. A fright may cause a premature birth, Jürgensen remarks facetiously, but it would never conceive a fœtus. So, rabies and hydrophobia can no more arise spontaneously than can dogs and men.

Thus is explained the specificness of acute infectious disease. Each one of these diseases produces itself alone. Measles begets measles, small-pox begets small-pox, cholera begets cholera. Figs would be born of thistles, or grapes of thorns, as soon as cholera of small-pox or diphtheria of typhoid fever. The introduction into the blood of a specific germ begets the specific disease, and the fact that each one of the acute infections has always presented the same characteristics, proves most conclusively that *no change has occurred* in the properties or peculiarities of the specific cause. For so long as observations have been recorded, measles, for instance, has always been the same disease, with the same period of incubation, the same prodromata, and the same eruption, the same complications and the same termination. New interpretations of the phenomena of the acute infectious diseases have been made from time to time, more searching means of study have developed new signs, but the characteristic features of each of the acute infections have always remained the same. The accurate observations rendered possible by the adoption of the solid culture soil are in thorough accord with these conclusions. The essential nature of pathogenic bacteria is not changed by alterations in the soil or other surroundings. Bacteria may be shriveled or dwarfed or reproduction checked by lack of oxygen, unsuitable nutrition, improper temperature, but they may not be changed in nature. Up to the present time it has been found impossible to convert innocent into pathogenic forms, and the observations recorded which seem to lend support to the transmutation theory, as by Buchner, Bastian, Nägeli, and others, have been shown to rest upon inaccuracies or impurities.

Attenuation not Change of Nature.—But the case is very different with the converse of this view, which opens up one of the most interesting studies in mycology. Is it possible to deprive the pathogenic forms of their pathogenic properties? The belief is still maintained, by some clinicians at least, that vaccinia is smallpox which has lost its virulence by passing through the body of a cow, and the question of attenuation of the so-called virus of virulent disease with the view of inoculating it in milder form, occupies the attention of prominent mycologists at the present time. Within the present decade this question has been answered in the affirmative with reference to the virulent bacteria of charbon. For it has been discovered by Pasteur and by Koch that under the influence of high temperature and various chemical agents, the bacteria of charbon may be made to suffer loss of their pathogenic properties, while they still retain all other characteristics, including the capacity of reproduction. Pasteur claims to have effected the same attenuation in the case of hydrophobia. But these observations do not support the view that any change of nature has been experienced in this way. Bacteria thus treated are not changed into innocent forms. They have simply lost the physiological property of infection. Baumgartner puts it pertinently when he says it is not a question of changing poisonous into innocent snakes, but of extracting the poison fangs from animals which otherwise remain the same.

The Morphology of Bacteria is not simply a question of size and shape. The term is extended to include also motion, color and affinity for color, as well as the manner of growth or disposition of the colonies. In many cases such distinctive peculiarities are already demonstrated as to render it possible to absolutely diagnosticate disease in life by one or more of these points. As Hueppe says, this is the most interesting question for the clinician. May we make a differential diagnosis from morphology alone?

Bacteria vary greatly in both length and breadth, but are for the most part so small as to be on the confines of the visible with the microscope. In fact, it is chiefly by reason of the recent improvements in the illumination and magnification of the microscope, the oil immersion lens and Abbé illuminating apparatus, that they have been rendered visible at all. Some of them are to be seen only with a power of 700 diameters, which is the magnification generally used in the study of all micro-organisms. Mycologists speak of micro-, meso- and mega-coccus, or bacteria, of the micrococ-coccus prodigiosus, and of the bacillus subtilitis, but these are all, of course, relative terms. Pathogenic micro-organisms vary in length from 1 to 40 mikro-millimetres, and in breadth from 0.5 to 7mm. Many micrococci are to minute to admit of any accurate measurement. The largest micro-organism is the spirilla, which may reach the length of .2 of a millimetre. Perhaps a better idea of size can be conveyed by comparison with a familiar object. The bacillus tuberculosis, which occupies in respect to size a median place, varies in length from 1–2000 to 1–3500 of an inch, the smaller measure being the average diameter of a corpuscle of human blood.

Although some distinction may be made between pathogenic and innocent organisms by their size and shape, the most skilful mycologist would hesitate to express an opinion on this fact alone. But micro-

organisms may look alike and yet be very different. Spermatozoids of different animals may present the same general appearance, but they are endowed with very different properties. We remain as yet at too great distance to make out the distinguishing features even of innocent and dangerous micro-organisms. As Birch-Hirschfeld remarked, it would be impossible to declare of a man standing on the spire of the Strasburg cathedral, whether he was black or white, and even the same configuration in every particular would furnish no more definite criterion than in the case of full grown serpents of the same appearance, some of which only are poisonous. We await now with intense interest the revelations which are to follow the experiments with the new theory worked out by Professor Abbé, which it is claimed already exhibits differences in the structure of bacteria.

The general construction of bacteria, so far as it can be studied, is simple enough. Bacteria are cells because they are constituted, grow and divide like cells, and although nuclei have not yet been discovered in them, they are in this regard not unlike other low forms of vegetable cells. The protoplasm of the cell seems homogeneous in the minutest, but more or less granular in the larger and more distinctly visible forms. It shows the same reactions and takes up the same colors as other protoplasmic bodies, differing as they do in different forms. The cell is invested with a membrane which may be separated from the protoplasm by agents like the alcoholic solution of iodine, which shrink the protoplasm. The membrane assumes prominence also at the period of spore formation. It is in most cases firm and closely apposed to all contents, while in the spirochates it is extensile and elastic. Dark, transverse lines forming across the protoplasm indicate the division of a bacterium into daughter cells, which separate in the process of reproduction. Hence the name schizomycetes. A billiard ball, a lead pencil and corkscrew, indicate in the homely comparisons of de Bary the chief varieties of bacteria as micrococci, bacilli and spirillæ.

Distinction of Bacteria.—A glance would reveal the difference between a bacillus and a spirilla, and there could be no question of mistaking a micrococcus for either. In many cases even gross morphological resemblances could create no embarrassment in the mind of the practitioner. What possible doubt could exist, for instance as between the comma bacillus of the stools and intestinal contents of cholera and the innocent comma bacillus found in the mouths of healthy people? The condition of the patient decides it at once, or if there could still be a doubt, it would be dissipated with a knowledge of the fact that the cholera bacillus is not found in the mouth. But in many cases differences in form alone are too slight, and variations in size too great to be recognized by the clinician. In some cases these differences can be seen. Thus the slight deviations between the forms of the bacilli of milzbrand and malignant œdema enable mycologists to separate diseases which are often confounded. But these distinctions may be made out only in the laboratories of experts. Hence for practical use appeal must be made to other factors in morphology. Thus the bacillus of tuberculosis, syphilis and leprosy closely resemble each other, that is closely to the clinician, though coarsely to the mycologist. But the tubercle bacillus distinguishes itself from all other bacilli save one, by two peculiarities: first, lack of affinity for all dyes, that is, the resistance it shows to colors, and, secondly, when it is colored with alkaline dyes, by the persistance with which it retains its color in the presence of mineral acids. This persistence is shown only by the bacillus of leprosy, but the bacillus of leprosy may be differentiated by the fact that it may be colored with Weigert's nucleus color, (hæmatoxylin, alcohol, alum, aa 2, distilled water, glycerine, aa 100), which has no effect upon the bacillus tuberculosis. The colored bacilli of syphilis are decolorized by mineral acids. By the method mentioned Gaffky discovered characteristic bacilli in the sputum of tuberculosis in 938 of 982 cases.

Considering the fallacies of the observations, and the stage of prephysical signs, it is safe to say that the time is close at hand when we shall no longer think of using the pleximeter and the stethoscope in the diagnosis of tuberculosis.

A skilled mycologist would alone detect the fine differences in morphology of the bacilli of cholera and cholera morbus, but any one would notice at a glance the difference in the funnel and cone or stocking shaped colonies of the two varieties. As, however, the length of time that must necessarily lapse to make this observation precludes its practical value to clinicians, quicker conclusions can be reached by the physiological test, that is the introduction of the germs, or matter containing them, into the stomachs of guinea pigs. These animals are very susceptible to cholera morbus, but insusceptible to true cholera, without special preparations or precautions. Perhaps this test would be resorted to only in cases where doubt existed as to the commencement of an epidemic of Asiatic cholera.

The method in which the bacteria aggregate themselves in the process of growth in the culture soil, the process of colonization it would be called in the tissues of the body, or *the formation of zooglea*, furnishes some, but uncertain information regarding the nature of the germ. Cohn thought at one time that the whole class of bacteria might be divided into two distinct species, one of which formed a mucus-like mass, the other fibrils or threads. These classes he proposed to designate as gleogenous or mucus-forming, and nematogenous or thread-forming families, but he was compelled subsequently to abandon the idea on observing the changes in the mode of growth in different soils and at different temperatures. Thereupon Koch observed that the formation of zooglea in the form of membranes or fibrils, squamous, dendritic, fenestrated, nodular, globular, circular, etc., immediately preceded the development of spores. Both Cohn and Koch soon reached the conclusion that while the form of the colony might serve to separate families and groups, estimates based upon such observations must be accepted with much reserve. But while it is admitted that the form of the zooglea varies in different soils, it is nevertheless true that a typical

form is shown under the same conditions, a fact which Hueppe remarks, essentially lightens a differential diagnosis. To give but one example, the bacillus anthracis may be macroscopically distinguished from the non parasitic bacillus subtilis by the fact that the anthrax bacillus forms in its soil a flocculent deposit, while the bacillus subtilis develops a dry membrane upon its surface.

The development of bacteria does not differ from the higher vegetations in requiring the necessities of life; food, heat, oxygen, water, etc.

Pure Culture Soils.—The question of food is connected with the subject of cultivation in the so-called pure culture soils, which consists in selecting the food best adapted for the rapid multiplication of micro-organisms. The fact that bacteria remain sterile in certain soils and luxuriate in others does not surprise us when we reflect upon the predilections of higher forms of vegetation.

While, then, many bacteria may be cultivated in almost any kind of culture soil, they differ in the degree of development according to the nature of the soil. Thus Wilkommen has observed that the germs which thrive upon the South American potato can not be made to grow upon the European potato. The micro-organisms which give the peculiar piquancy to Stilson and Roquefort cheese grow better in certain cellars than in others. The first experiments in cultivating bacteria were in fluids, solutions of meat, beef tea, chicken soup, malt extracts, infusions of hay, etc., but fluids are open to the objection that they admit other germs, to coalesce with and rendered impure the special variety to be studied. Pure cultivation became possible only with the use of the pure culture soil, first employed by Koch. Germs falling upon a solid surface remain fixed in the same place. The solid culture soil made practicable the absolute isolation of germs, without which accurate investigation is impossible. Koch made his first studies with the common potato. The potato was the key to the whole subject of solid cultures. We might say that what the apple was to Newton the potato was to Koch. Subsequently gelatine was employed, then aqueous humor, then gelatinized meat preparations, peptonized gelatine, etc., and as a climax for the epicures, gelatinized blood. Thus has been determined the peculiar soil in which the varieties of pathogenic bacteria thrive the best. Thus while the bacillus of both forms of cholera develop upon both animal and vegetable soils (both being really exanthropic germs), the bacilli of tuberculosis will not grow in a vegetable soil as upon the surface of a potato, but will thrive in infusions of meat and luxuriate in the serum of the blood. The micrococcus of chicken cholera grows to swarms in neutralized chicken-soup, and the comma bacillus, which is really not a bacillus, but a form of vibrio or spirilla, develops in such luxuriance in alkaline meat soups as to have enabled Schottelius to detect it in minimum amount. In such cases, where but very few or doubtful specimens were present in the intestinal contents, Schottelius added to the contents two and a half times as much slightly alkalised infusions of meat, or ten times as much gelatinized meat peptones. In this mixture preserved uncovered in a warm place at a temperature not above 40° C. cholera germs developed in myriads within twelve hours.

Effect of Bacteria on Food.—In this connection a remark may be made upon the effect of bacteria upon the food selected, foreshadowing the local effects of micro-organisms upon the tissues of the body in the so-called local symptoms of disease. It is observed and distinctly tabulated if the gelatine or other food be fluidified, granulated, colored, decomposed, with or without the development of odors and gases, and the time required to induce these changes. Thus have the mycologists made us familiar with characteristic features of the vibrios of both forms of cholera, which fluidify gelatine, while the micrococci of pneumonia have no such effect; have pointed out the nail cultures of pneumonia, the air vesicles of Asiatic cholera, the flat scales of tuberculosis, the fern leaves of the micrococcus of erysipelas, the acacia leaves of one form of the micrococci of pus. So also of the effect of puncture or stick cultures show peculiarities different from plate cultures, and different effects are observed again with the same bacteria in different kinds of soil or food. Eisenberg has recently (Hamburg and Leipsic, 1886) published a Bacteriologische Diagnostik, which consists of a series of tables wherein are noted, in a form of inestimable value to the student of bacteriology, all these peculiarities of all known germs.

Concerning Temperature.—Three cardinal points are recognized of the temperature: the maximum, the minimum and the optimum. The optimum is the temperature most conducive to fructification, to spore formation. Excesses in either direction arrest certain processes, extremes destroy life. As might have been premised, non-parasitic enjoy much wider latitude than parasitic germs. Thus, according to Cohn, the bacterium termo grows between 5° and 40° C., with its optimum at 30° to 35° C., while the border temperatures of the bacillus tuberculosis, according to Koch, are 28° and 42°, with an optimum at 37°, the temperature of the human body. The conjoined influence of soil and temperature is shown in the conduct of certain bacilli (tyrothrix) found in cheese. The optimum temperature of this germ is 25° to 35° C. In a neutral fluid they are killed by a temperature of 90° to 95° C., while in a weak alkaline fluid they live at 100°. The mature spores of this species remain productive in a weak alkaline fluid after being boiled at a temperature of 115° C. Tyrothrix filiformis survives in milk a temperature up to 100° C., a degree fatal in one minute in an acid fluid. The spores of this species survive in milk a temperature of 120° C., while in gelatine they are destroyed at 110° C. This knowledge of the range of temperature gives a differentiation at once of parasitic from non-parasitic bacteria, as germs whose range is limited to 28° to 42° C., may not constantly find anywhere upon earth, outside of animal bodies, the necessary means of existence.

Need of Oxygen.—Such differences prevail regarding the need of oxygen that Pasteur separated all micro-organisms into two classes, ærobes and anærobes. As, however, all known pathogenic micro-

organisms must have oxygen more or less, the division is of more value to the mycologist than the clinician. One point in this connection regarding the ammoniacal degeneration of urine is of interest to the practitioner.

Bacteria of Urine.—This degeneration, as is well known, results from the conversion of urea by the absorption of water, into the carbonate of ammonia, during which process the originally clear fluid becomes cloudy and opaque. A drop of this urine under the microscope discloses myriads of germs of all descriptions. Cohn has shown that one of them, the micrococus ureæ, is the prime cause of the ammoniacal change. Pasteur had already discovered that this micrococcus. cultivated pure in a fluid containing urea induced in it the same change as in urine, and Musculus has since disclosed the fact that the change is induced by a chemical product, an enzyma separable by alcohol, excreted from this particular germ.

The presence of oxygen is a necessary condition of the life of the micrococcus ureæ, which cannot, therefore, be the cause of the ammoniacal degeneration that in bad cases of catarrhal inflammation takes place within the bladder, a sac shut in from the outside air. It was then assumed that this degeneration must be affected by other anærobic bacteria, and in fact, minute forms are found in freshly voided urine.

It is interesting to know that Miquel discovered in dust a very delicate bacterium which vegetates in the absence of oxygen. This bacillus he named the bacillus ureæ, because it has the power of converting urea into the carbonate of ammonia. Hence the force of Teuffel's warning, "Put no soiled catheter into the bladder."

The Fecundity of Micro-Organisms has been so often demonstrated in explanation of the suddenness of appearance of them in multitudes, and of the virulence of infectious disease, as to require mention here only for the purpose of checking the riots of the imagination. It is known that a particle from a milzbrand bacillus, so small as to be invisible under an ordinary lens, introduced beneath the skin of a guinea pig, multiplies sufficiently to kill the animal in forty-eight hours, and a drop of the blood of the animal thus affected, properly inoculated, destroys the largest ox in a few days. It is useless to dwell upon this point of propagation. It was the recognition of it that more than another compelled the return to the germ theory of infectious disease when it seemed to have been routed even with contumely. No purely chemical substance possesses this property. The power of reproduction or self multiplication is limited to living things. Chemical substance admit of great subdivision, as best exemplified, perhaps, in the dissemination of odors, but such subdivision is attended always with gradual loss of substance.

Reproduction takes place in bacteria, whether by fission or spore formation, a rapidity bordering on the marvelous. Cohn indulged himself in the pursuit of a calculation, reaching the conclusion that the progeny of a single bacterium, unchecked in growth, would in the course of three days reach the apalling weight of fifteen million pounds Troy, and in five days fill up a space of 928,000,000 cubic miles, the estimated capacity of the entire ocean. But while some such calculations may be justifiable to convey some adequate idea of the degree to which the earth and the air may be filled in a few days during the prevalence of an epidemic, it must be remembered that it was flights of fancy like these that first brought the germ theory into discredit and derision. Check is put upon the development and reproduction of all bacteria by the lack of nutrition, which sooner or later must ensue, as well as by the inimical action of different varieties upon each other. Thus the bacteria of decomposition cease to multiply and perish by the myriad so soon as the material of their food is converted into inorganic matter; the bacteria of fermentation are destroyed, or their reproduction checked by the alcohol which they form; the bacteria of cholera with dessication, etc. The bacteria of most diseases perish with the death of their host, as well as from various other causes in life, as by the fever they evoke, or are themselves destroyed by the bacteria of putrefaction.

Thus it has been proposed to cure trachoma with the gonococci of gonorrhœa, lupus and epithelioma with the micrococci of erysipelas, and tuberculosis by the inhalation of the bacteria of putrefaction.

Spore Formation.—The conditions affecting the process of fructification are of extreme importance to the proper understanding of the cause and prevention of acute infectious disease. A single bacterium is made up of several cells of parts, of which each cell forms one spore. Pasteur first recognized these "brilliant corpuscles," but it remained for Koch to determine their significance, and for Prazmowski and Hueppe to establish their supreme value from the point of view of differential diagnosis. The difference in the method of spore formation is also a chapter of itself which could find no discussion in the limits of this report. It is enough to say here that characteristics of specific bacteria are as definitely determined in the observation of these phenomena as in the effects of inoculation. Spores constitute the permanent forms.

Endospores and Anthrospores.—There is now quite general acceptance of de Bary's division of all bacteria into classes, one multiplying by endospores and one by arthrospores. Endospores are spores evolved from protoplasm in the body of bacteria in such a way that the spore forms its own membrane, while an arthrospore is a transformation of an entire part or cell of a bacterium, the membrane of the bacterium forming the membrane of the spore. True bacteria develop by endospores. Such are the pathogenic bacteria, whether in the form of micrococci, as of erysipelas, pneumonia, gonorrhœa, suppuration; bacilli, as of tuberculosis, syphilis, leprosy, diphtheria, milzbrand, glanders and typhoid fever.

Spores are distinguished from micrococci by their bluish, opalescent cast, their high refractive power, and their obstinacy to color, because of the impermeability of their membranes. Strong acids and extreme heat, which kill the protoplasm of the bacteria, injure the vitality of the spore membrane, to make it permeable and admit color. Under such conditions spores may be colored intensely while the body of the

bacterium is only feebly or not at all affected by color. Spores of all kinds are characterized by extreme tenacity of life. Most endogenous spores remain productive after exposure to 100° C., many even to 130° C. Anthrax spores survive a dry heat of 123° C. Endospores survive dessication on an average about one year; those of the bacillus subtilis, according to Brefeld, three years. Pasteur claimed to have kept spores in hermetically sealed tubes, capable of reproduction after twenty-two years. Such long sustentation of life is capable, of course, only under favoring conditions. Botanists generally admit persistence of vitality in seeds from ten to twelve years. Statements of persistence for centuries, as from mummies' tombs, are considered mythical. As a rule, as stated, spores perish in a few years, so that limit is to be put upon the assertion of an enthusiast in antisepsis that "time does not destroy septic dirt."

Bacteria of the Alimentary Canal.—The surface of the earth is the bottom of an ocean of air teeming with micro-organisms of every description. The origin, character and distribution of these germs is a subject of itself. Myriads of them, among others, pathogenic germs are ingested and inhaled every day. The alimentary canal throughout its length is described as a rich garden of vegetating bacteria. Most mature forms ars destroyed in the stomach under the action of the gastric juice, but many spores, and some mature forms—sarcinæ, for instance—escape to reach the intestine with all the favoring conditions of a hothouse. The mycologists speak of the flora of the feces; in fact, masses of feces are almost wholly masses of bacteria.

Bienstock, who has made a special study of these bacteria, succeeded in isolating one bacillus endowed with the specific property of decomposing albumen and fibrin. Cultivated to obtain sufficient quantity it separates albumen and fibrin through all the successive stages of decomposition with its gases down to its final products, carbonic acid gas, water and ammonia. No other bacteria have this property. Artificial albumen is not attacked, and casein is not touched by it. Hence it is that the stools of sucklings emit no fecal odor.

These bacteria of the intestinal canal belong to the class of *saprophytes*. They have to do with the resolution of organic into inorganic matter, and they are hence the greatest friends of man. They have no power of penetration to the blood. It is now almost universally conceded that no germs exist in the physiological interior of the healthy body. No germs exist in healthy blood. An apparent exception proves the rule. In a number of observations with negative results, Klebs once found bacteria in the blood of an apparently healthy dog. It was subsequently learned that bacteria of decomposition had been previously introduced into this dog in an experiment on wound sepsis. The animal had long since perfectly recovered. The germs found by Klebs had still survived, and were remaining at the time of the observation quiescent. It was an observation useful also in illustration of the latent stage of disease. But even useful saprophytic germs become dangerous when they do enter the blood through breaks, sloughs or ulcers formed by pathogenic germs. Such secondary saphrophytic immigration occurs in diphtheria, typhoid fever and small pox as to have until recently occasioned much confusion in the recognition of the true pathogenic germs. Invasions of this kind, independently of these diseases, are probably responsible for many non-infectious septicæmias of surgery and obstetrics, as well as for many vague "rheumatisms," malarias," "colds," "teethings," and "gastric fevers" of internal medicine.

Pathogenic micro-organisms enter the blood through solutions of continuity in the surface of the skin and mucous membrane, including the lungs. The germs of tuberculosis, pneumonia and all the acute exanthemata probably enter the blood by way of the lungs, which permit the passage of larger and grosser matters in the dust of coal, iron, etc. Each micro-organism has its own history in its preference of site, *mode of invasion*, *dissemination* and effect upon the tissues of the body. A notice of one or two of the best studied will serve in illustration.

The micrococci of erysipelas are deposited upon the epidermis at some break of the surface, which break may have entirely healed by the time the disease is recognized, to distribute themselves chiefly in the lymph vessels of the skin and subcutaneous fat. Hence the superficial character of the disease. They multiply, according to Fehleisen, in a direction opposite to that of the lymph currents. They are never found in the blood or in distant organs.

The bacteria of decomposition take quite a different course. One set, the staphylococci, multiply in the connective tissue without entering the lymph vessels; another set, the streptococci, enter the lymph vessels and follow their course to constitute the lymph —angiectatic processes. Suppurative phlegmonous tracts indicate their presence.

The micrococci of gonorrhœa are endowed with the property, according to Bumm, of penetrating to and multiplying in the protoplasm of the urethral cells to effect their dissolution. Hence they are distributed by the lymph vessels or are carried directly, to be found in the bladder, kidneys, Bartholine glands, periurethral abscesses, rectum, neck and body of the uterus, sacs of the conjunctivæ, and joints of the knee.

The bacillus tuberculosis, which is at the present time perhaps the most universally distributed of all pathogenic germs, finds less ready victims than that of cholera and milzbrand, because of its immobility, its slower growth and less poisonous products. On account of these factors the extension of the disease in the body remains, as a rule, circumscribed. Wandering cells sometimes carry it, but its transfer to distant organs, bones, joints, testes, meninges of the brain, etc., is chiefly effected by a quite accidental irruption into blood and lymph vessels. Thus, Weigert has demonstrated at local depots the erosion of and penetration into the walls of veins, Koch a direct irruption into small arteries, and Ponfick the perforation of the thoracic duct with the sudden inundation of the whole body to constitute the clinical picture of miliary tuberculosis. Thus, also, is easily explained the sudden aggravation of tuberculosis in

latent, quiescent and convalescent cases of the disease.

Eberth and Gaftky likewise describe the penetration by typhoid bacilli of the intestinal mucous membrane, with subsequent infiltration of the submucous tissue, muscular coat, mesenteric glands, and escape thence into the blood to accumulate in the spleen. Hein claims to have discovered them in the spleen during life, but Frænkel and Simmonds (*Die ætiologische Bedeutung des Typhus Bacillus*, Hamburg and Leipsic, 1866), with good reason discredit this claim, though they were able to make pure flat cultures from the spleen post-mortem in twenty-five of twenty-nine cases. The bacilli of typhoid fever increase in the spleen so rapidly soon after death as to render their detection easy.

The Effect upon the Tissues of the body presents the same differences as the effect upon culture soils outside of the body, and here again each micro-organism shows its own peculiarities. The superficial catarrhal and diphtheritic processes, parenchymatous infiltrations, coagulation necroses, neoplasms, etc., coarsely correspond to the alterations observed in the artificial culture soils.

Erysipelas, again, a surface disease, open to inspection, offers in the studies of Fehleisen perhaps the most accurately recorded observations in this regard. Fehleisen found that he could distinguish four layers or zones of inflammation. The first, the peripheric, extended about one centimetre beyond the reddened and elevated border wall. It showed no visible lesion, either in color or thickness, though its lymph vessels were stuffed with micrococci. The wall mentioned is itself the second zone, the zone of inflammatory reaction. It consists of the rapidly multiplying micrococci with wandering cells which have partly taken up, included or ingested the bacteria, to finally displace and substitute them altogether. A small celled infiltration with a total absence of bacteria marks the third zone, while the fourth shows only pallor or anæmia of the skin in process of restitution *ad integrum*. The accompanying fever and gastric catarrh—out of all proportion at times to the extent of the disease—are the results of chemical changes induced by the micrococci.

The fact that the same local phenomena are present in erysipelas migrans without constitutional signs, would indicate that this disease is due to a different, though allied germ. Rosenbach found this disease often in individuals whose avocation deals with animal matter. Slight wounds of the hands in butchers, tanners, cooks, are frequently points of origin for a brownish-red infiltration which takes the precise course of erysipelas. From this infiltration he was able to cultivate a special micrococcus inoculable by puncture, to produce the same condition.

True erysipelas is entirely unattended with suppuration or other destructive change than fatty degeneration of the epithelial cells and restitution by new formation. Suppurative or phlegmonous processes indicate a mixed infection with the staphylococcus or streptococcus which produce this condition. The supervention of a still graver complication, gangrenous emphysema, is due to another micro-organism, this time a bacillus, of entirely different nature, whose effect is to produce hæmorrhagic infiltration of the deeper muscular structure, with the development of the gases of decomposition.

Action of Micro-Organisms on an Internal Surface.—A good illustration of the action of micro-organisms on an internal surface soil is offered by Löffler in the growth of the dumb-bell bacillus of diphtheria, which produces deep and extensive layers of false membrane in the fauces, pharynx, and trachea. The glutinous and pultaceous mass thus formed is a quicksand to catch and entangle the myriads of micro-organisms ingested and inhaled, in such inextricable confusion as to have made it for a long time impossible to pick out the specific cause of the disease. Beneath this superficial layer Klebs and Löffler at last succeeded in finding a special layer containing numerous cells among which, aggregated in small colonies, were special bacilli which admitted intense coloration with methyline blue. The layer beneath this again, directly superimposed upon the dilated vessels, is a fibrinous mass composing the bulk of the false membrane. It contains but few cells and no bacteria, and represents the product of reaction of the mucous membrane to the virus of the bacteria. This deepest layer is produced by the coagulation of a fibrogenous exudation which escapes from the blood-vessels and opposes a barrier to the further advance of the bacilli. Breaks in this barrier permit the absorption of the virus emanating from the bacteria or their products, to produce the constitutional symptoms of the disease.

Production of Neoplasms by Bacilli.—The bacilli of tubercle, leprosy, syphilis and glanders affect the soil of their selection in the body quite differently, in that they produce granulation tumors, neoplasms characterized by a tendency to rapid dissolution by fatty or calcareous degeneration. The cellular element of these tumors resembles that of the lymph glands. Taking tubercle as a sample, they are round cells, of various size, the medium size resembling a white blood corpuscle, with small, round, shining nuclei, provided with nucleoli. The large cells contain two, even up to twelve nuclei. Accumulation of these cells constitutes the nodule which the old anatomists named tubercles.

A tuberculous mass, on schematic section, shows an outside ring of round cells provided with a single nucleus about a narrow ring of epithelioid cells, which finally enclose one or more giant cells. The bacilli of tuberculosis are found in all parts of the tubercu lous mass, free—that is, between the cells—as well as in the interior of the cells.

Behavior of Bacilli in Giant Cells.—But the most characteristic as well as curious phenomena are presented in the behavior of the bacillus in giant cells, a question which brings the subject to its most intimate ultimate relations.

The giant cell, as is well known, is distinguished by the number of its nuclei, as well as by its size. When now but a single bacillus penetrates to the interior of a giant cell, whose nuclei are disposed about the circumference of the cell, it is commonly found in the free space at or near the middle of the cell. But it

is more common to find all the nuclei grouped together at one end, with the bacillus at the opposite, often at the extreme opposite, end of the cell. The poles of the cell are thus occupied, one by the nuclei, the other by the bacillus. Thus they stand facing each other like foes, and it is impossible to resist the conclusion that there exists between them an antagonism which keeps them as far as possible apart.

When two bacilli are present it is not unusual to find one at each end or pole of the cell, while the

The Bacillus in the Giant Cell.

nuclei are all grouped about the centre or equator, or the relations being changed, the bacilli are disposed at the equator while the nuclei are grouped at the poles. It looks, Mittenzweig says, as if each group of nuclei was holding a bacillus in check. When the number of bacilli is greater, they do not

long remain in this passive state. For they are soon to be seen at different places in the cell, close to and between the nuclei, with their long axes perpendicular to the surface of the cell. The wall of the nucleus is thus broken down and the giant cell succumbs. Groups of bacilli are thus found arranged in stellate form, but no longer surrounded with nuclei.

Koch concludes, hence, that the penetration of an epithelioid cell by one or more bacilli is the first step or stage in the origin of a tubercle. The virus or poison emanating from the bacillus irritates the cell to such degree as to lead to increase in its size and multiplication of its nuclei; in other words, directly to produce the giant cell. The irritation extends to neighboring cells, to induce hyperplasia, and to vessels, to lead to emigration of the white blood corpuscles. Meantime, the struggle continues in the giant cell, to end occasionally in the destruction of the bacillus, but far more frequently in the triumph of the germ. They then break through the circle of nuclei, escape from the wall of the cell to attack new cells with similar fate. The ruptured cell suffers necrosis, the plasma current ceases, plasma and nuclei coagulate, nuclei are broken up into debris, and the whole cell is converted into a homogeneous, inert, dead mass. The condition may be arrested at this stage, as in the spleen, or may, as is usual elsewhere, suffer a later conversion into caseous matter. Bacilli which have not escaped to other cells perish with the death of the cells, their hosts. Syphilitic neoplasms show the same phenomena, except that they are more prone to undergo fatty degeneration, resorption and cicatrization (Mittenzweig).

Bacteria in the Blood-current.—The conduct of bacteria in the blood-current itself or their effect or action upon the elements of the blood is but little known. In most cases the stay is too short for any permanent effect. But one curious observation has been made by Metschnikoff concerning the bacilli of milzbrand and the white blood corpuscles, which throws light upon the question of susceptibility and immunity of disease. With suspicion based upon the familiar fact of the absorption of food and foreign bodies into the interior of amœboid bodies, by protoplasmic protrusions and inclusions, and more especially upon the observation of a disease in small crustacea caused by the entrance or ingestion of a peculiar sprosspilz into the coloring blood corpuscles of the animal, Metschnikoff concluded to study the relations of the milzbrand bacillus to the white blood corpuscles of vertebrate animals. He soon discovered that the blood corpuscles of susceptible animals (rodents) only exceptionally incorporated virulent bacilli, whereas the blood corpuscles of insusceptible animals (frogs, lizards) took them up abundantly. Being thus ingested or included, they soon perish in the interior of the cell, to finally entirely disappear. The same fate awaits milzbrand bacilli in the bodies of susceptible animals, when the virulence has been attenuated or abstracted in any way, as by artificial heat.

Leucocytes as Phagocytes.

Immunity.—These observations, should they meet with wider confirmation, must throw light upon the obscure subject of immunity conferred by an attack of disease against its repetition, as well as upon protective vaccination. For we lack as yet a sufficient or satisfactory explanation of the immunity thus conferred, though three plausible hypotheses have been proposed. The first is the theory of exhaustion, which assumes that the germs of the disease exhaust the elements in the blood necessary to their nutrition. Something analogous to this is seen in vegetation of higher structure, which cannot be made to grow indefinitely in the same soil. The second is the antidote theory, or the theory of antagonism, which supposes that certain products evolved from the soil in the multiplication or growth of germs react upon them fatally. The analogy here is found in the process of fermentation, whereby the torulæ cease to produce themselves, become quiescent and sink to the bottom of the vessel as soon as the proportion of alcohol reaches twenty per cent. There is reason to think that the fever evoked by micro-organisms is

in some cases fatal to their growth and life. The third is the theory of accommodation, which maintains that the tissues in their first struggle with the micro-organisms acquire a higher degree of energy or vitality, whereby they are enabled to endure or resist future attacks. Perhaps a simile may be found for this hypothesis in the process known as acclimatization.

Incorporation and Absorption of Germs.—The observations regarding the incorporation and absorption of non-virulent or less virulent germs tend to support the theory of accommodation. For it would follow from them that protective vaccination, or more properly inoculation of weak bacteria, must confer upon the blood corpuscles the power to incorporate and destroy virulent bacteria. When protection is not sufficiently secured at once by a certain grade of attenuation, it might be accomplished by successive attempts with gradually increasing potencies. Thus successive inoculations of gradually increasing virulence would finally permit the introduction into the body of the most intensely virulent bacteria with impunity. It is upon this theory that Pasteur bases his claim to secure prophylaxis in hydrophobia, a disease in which sufficient time lapses, as a rule, between the wound and the symptoms to make experiments even after the wound, in the hope of anticipating the attack of the disease. The fact that virulent bacteria are not absorbed would indicate, in the absence of any morphological difference, the presence in these bacteria of some chemical substance which antagonizes the cell. Moreover, the character of the constitutional symptoms; sopor, stupor, coma, delirium, which supervene in cases of grave acute infections, speak in favor of this view, and against the belief that bacteria act mechanically or by the abstraction of oxygen. In fact, neither the local nor the general signs of infectious disease are ever produced or can be produced in this way.

How do Micro-organisms Produce Disease?—The question now arises, how do pathogenic micro-organisms produce the phenomena of disease? From the rapidity of their multiplication, it might be inferred that the symptoms and lesions of the infectious maladies were caused by the mere presence of these organisms as foreign bodies. But it has been observed that the bacilli of milzbrand alone multiply in the body in such number as to produce extensive occlusions of vessels. Further, it has been shown that no mere mechanical presence, no mere foreign bodies, aniline particles, or granules of cinnabar, ever induce the signs of fever or toxicemia. The micro-organisms of disease live in the body, and must therefore be nourished at its expense, whereby they withdraw from the blood or tissues elements essential for their nutrition. Pathogenic micro-organisms require oxygen. In processes of fermentation, outside air is excluded, that the germs of fermentation may be compelled to withdraw oxygen from its soil. Pathogenic micro-organisms multiplying in great abundance seize upon the oxygen of the blood with such avidity as to develop in fulminant forms the symptoms simulated by prussic acid poisoning. But the the other symptoms mentioned do not correspond either to deficient oxygenation or carbonic acid poisoning.

These symptoms indicate toxicæmia, and since the injections of fluids from which bacteria have been separated by porcelain filters remains innocuous, it follows that the toxic agent inheres with the bacteria. Then, inasmuch as blood corpuscles show their reaction against bacteria on simple contact, it follows that the poison must lie upon or issue from their surface.

Ptomaines.—The only hitherto known poisons which may in such minute quantities induce such grave toxic signs are the poisons resulting from the action of the bacteria of decomposition upon organic matter. As these intensely virulent poisons were first observed only in dead organic matter, they were called ptomaines (from $\pi\tau\tilde{\omega}\mu\alpha$, the fallen, a corpse, hence more grammatically ptomatins). These matters, the ptomaines, though so newly known, have received so much attention in the past year as to form a subject in themselves. It may be said here that some cadavers develop no ptomaines, that ptomaines are developed as putrefaction advances in the course of weeks, next that they are also found sometimes in animal products, as in cheese, urine, fæces, etc., and lastly, that many ptomaines are perfectly innocent. Then it might be added that many phenomena attributed to their action have been found due to simpler causes. Thus the claim of Passet that any one of the eight forms of bacteria which he cultivated from pus would coagulate sterilized milk were found to rest upon simple lactic acid fermentation.

Brieger, who has made the most exact observations, operated with the Koch-Eberth bacillus of typhoid fever, which he cultivated from the spleens of fatal cases, and found to be identical with the pure cultures in the laboratory of Koch. These bacilli thrive in solutions of sterilized grape sugar, to which have been added the proper nutritious salts. This clear fluid, kept in sealed tubes at a temperature of 30° C., becomes opaque in twenty-four hours after introducing the bacilli, and emits, on opening the tubes, a distinct odor of ethyl-alcohol, which increases from day to day. Besides the ethyl-alcohol, there develop small quantities of volatile fatty acids, together with acetic acid in large quantity. The typhoid bacillus has also the property of inducing in solutions of grape sugar the lactic acid fermentation. Sterilized bouillon or minced meat used as soils, soon become alkaline, but develop, even after the lapse of eight weeks, none of the products or gases of decomposition. From these as from all albuminous cultures, Breiger was frequently but not always able to obtain a basic product which gave the chemical and physiological reactions of a ptomaine. In guinea pigs it produced a slight ptyalism and an increased rapidity of respiration, to be followed later by a loss of power in the muscles of the extremities and trunk, without a distinct paralysis. There is diarrhœa throughout; death takes place in twenty-four to forty-eight hours. The same observer is now experimenting with the septic diseases whose abnormal temperature elevations, interruption of functions, benumb-

ing of the intellect, perverse action of the digestive apparatus indicate abnormal chemical changes in high degree.

Nicati and Reitsch, Villiers, Pouchet, have all made similar investigations with the bacteria of cholera. According to Pouchet, chloroform extracts of cholera dejections furnish an easily oxydisable and intensely poisonous oily substance which is certainly a ptomaine. Mere traces of it introduced into the bodies of frogs induce retardation of the pulse, with speedy death attended by muscular rigidity.

Villiers also succeeded by the method of Stas in isolating a ptomaine from the intestines, kidneys, liver and blood in two cases which had succumbed to cholera. It was abundant in the intestines, but very scant in the blood. It had a sharp taste and an odor like the flowers of the white thorn. It had no effect upon frogs, but caused in guinea pigs retardation of the pulse, tremor and death.

According to the same author cultures of the cholera bacteria have a peculiar ethereal odor which is not unpleasant. Solutions of this culture not over eight days old in bouillon or gelatine filtered free of bacteria, injected into the blood of dogs induces diarrhœa and great depression, with dyspnœa, disturbances of motion and sometimes death.

These experiments are cited merely as samples to show the direction of research at the hands of the most advanced observers in the past year. They indicate the lines of study by means of which we shall be able to combat the cause of infectious disease in a direct way. They show us that the time is at hand when, as Brieger observes, we may as practitioners of medicine no longer be compelled to rely upon a raw empiricism, when we may find a specific therapy, if not remedy for a specific cause, since we have already learned that the accumulation of certain products of bacteria kill them. They show us that inflammation is not the cause but the effect of disease which is caused by infection. They show us the direct road to cure through comprehension of the nature of infection.

ORIGINAL ARTICLES.

SUGGESTIONS ON THE PURITY OF CHICAGO DRINKING WATER.[1]

BY H. GRADLE, M.D.

EYE AND EAR SURGEON TO MICHAEL REESE HOSPITAL.

No question of local sanitation has been more often and less intelligently discussed in Chicago, than the purity of our drinking water. While alarmists have filled the newspapers with sensational exaggerations, our authorities have denied all danger on grounds insufficient to prove the point.

The starting-point of any discussion must, of course, be the fact, that the sewerage of this enormous city is carried into the lake—the source of our drinking water, whenever the current of the river runs towards the lake, which occurs a large part of the time. Now, as there is no direct evidence that any one disease or class of diseases are due solely to the drinking water thus contaminated, how can we decide whether any danger to health lurks in this water? Chemical examination can only tell us whether organic material exists to a larger extent in our drinking water than it does in other parts of the lake remote from our shore, or than it did in the same waters many years ago.

But a positive result of such analysis would not necessarily condemn the water unless there were an excess of albuminoid ammonia larger than the limit shown by experience to be safe in drinking water.

On the other hand, when the analysis shows no marked change in the quantity of organic constituents in the water, it does not decide the question as to the safety of the water. For there is no reason to think that in our present case, where the sewerage is diluted by the enormous body of water in the lake, there can be enough of any chemical substance present to produce any poisonous effects. A chronic poisoning or a cumulative effect produced by the continued ingestion of an *organic* poison in such small quantities as not to produce any immediate sensible action is not known, and such a possibility is a gratuitous assumption not based on clinical evidence. We are forced, therefore, to look for living micro-organisms in any suspicious water—for at the present no other *direct* causes of diseases are known.

The algæ and diatoms, and occasional infusoria, figured by amateur scientists in the newspapers as existing in our drinking water, are about as harmless as any other vegetable or animal tissues we might eat as food. It has never been shown that they are really poisonous or parasitic to the body. The micro-organisms which demand our attention as suspicious, are the bacteria. Since they are not numerous in any but stagnant water, the direct examination of the water with the microscope teaches very little. Besides, hardly any variety likely to exist in the water could be identified on finding a specimen or two with the microscope.

In order to tell what there is in the water, we must do exactly as if we had a few seeds mixed with a lot of sand, and were unable to recognize them. We would sow them over a large surface of ground free from other plants and wait for the result,—identifying the plants as they grew up.

I have made a few such analyses of our lake water, according to the methods devised by Koch. The sample bottles with flat sides which I show you here, are thoroughly cleansed and boiled, and then partly filled with a small quantity of nutrient gelatine and their mouths plugged with cotton. The bottles and their contents are then sterilized by heating them in a steam bath for a few minutes on several successive days. This being properly done, they will keep forever without the occurrence of any bacterial growth in them. If now one or more drops of water flowing from the faucet or received in a sterilized beaker are dropped into these culture bottles while momentarily lifting the cotton plug, any bacteria or their spores thus introduced with the water will grow in the gelatine. If the drops of water are thoroughly mixed by shak-

[1] Read before the Chicago Medical Society, May 3, 1886.

ing with the gelatine liquefied by gentle warming, the germs will be separated from each other, and on letting the mixture suddenly congeal on the large surface of the flat side of the flask, and keeping the flask at a temperature of 18 to 22° C., the number of colonies of bacteria growing in the gelatine will indicate the number of germs contained in the water. Within 36 to 72 hours according to the temperature, the colnies grow sufficiently large to be counted with the naked eye.

In order to identify the species we must note the appearances and size of each colony, and then examine with the microscope the cells composing such a colony, both in the fresh state and after staining. If this be insufficient to recognize the variety, we must make fresh cultures from such a colony in other and different cultivating media, or finally test for pathogenic properties by experimentation on living animals.

There is, however, a limit to the capability of this method, viz.: our want of familiarity with all the pathogenic species of bacteria. Apart from cholera we know only one disease which has been traced in some instances to impure drinking water, and of which we can identify the causative parasite, viz.: typhoid fever. It is very likely that there are other intestinal disorders of parasitic origin—the different forms of enteritis and dysentery, the germs of which may be at times introduced by means of impure drinking water. But this could not be proven at present, because we do not know as yet the presumable germs of these diseases. It is also not impossible that the bacilli of tuberculosis, or their spores, may sometimes enter the system through the alimentary canal. Whether any other but intestinal affections can be started by entrance of their causative parasites through the digestive tract, is not known in the case of any diseases of man, but judging from the mode of introduction in animal anthrax, which is most frequently intestinal, this is not an improbable occurrence.

In the culture analysis which I have made, I have counted from 35 to about 50 germs per drop of our hydrant water—equivalent to about 1000 to 1500 germs per cubic centimetre. This is much more than Frankland found in London drinking water (from 8 to 70—extreme 382), and more also than was obtained by the German Board of Health from the Berlin water (usually from 20 to 100 or 200—sometimes to 400, exceptionally), though the latter contained as much as 1000 germs in each centimetre, before filtration in the water works. However, as bacteria exist in all fresh waters on the surface of the earth, there is nothing in this indicating any special impurity, for as we can judge from every-day experience, the immense majority of these bacteria are harmless. In my earliest observations, last summer, I counted six different varieties in my flasks. Since then my time and facilities did not permit me to continue the very tedious microscopic research necessary for differentiating the colonies. But from the gross appearances of the colonies with which the first observations made me familiar, I would say that only three or four kinds of baccilli are common, while other kinds of baccilli and occasional micrococci and spirilla are less frequently found. Many, if not most of the micro-organisms in our hydrant water exist in the form of spores, which are not killed by momentary boiling. On staining the residue of a few drops of water evaporated on a slide, there are indeed very few developed forms found. I need hardly add that I have not identified any pathogenic varieties.

Although these few analyses would, therefore, not entitle me to say that our water contains any deleterious matter, I do not see how we can escape the conclusion that there is really danger, however slight, in the use of our lake water. There were last year about 500 deaths from typhoid fever in this city. This means, perhaps, 5,000 to 6,000 cases of that disease. The discharges of all these patients contained typhoid bacilli, which were carried into the lake. Though the bacilli may die speedily in the water, their spores persist for days, if not for weeks and months. Is it at all conceivable that the currents should not carry at least some of them at times into the crib and water-pipes. I will not insist on the possibility of the discharges of different forms of diarrhœa and dysentery reaching us in a diluted form in the drinking water, because, as I said before, we are not yet familiar with the germs of these diseases, and do not know whether they produce persisting spores. Indeed, outside of typhoid fever, I could not name any danger threatening us in the water, if I depended *only on the known facts*, but analogies and probabilities suggest a great deal more. The enormous dilution to which the sewerage is subjected when carried into the lake, reduces, of course, the probability of infection through drinking water very much, but does not remove it. The self-purification of water, which undoubtedly occurs through the starvation of the micro-organisms, and their deposition, and perhaps oxygenation, pertains principally to the developed forms and not nearly so much to the spores. In short, we cannot but reason that of the millions of disease-germs poured into the lake, some few must find their way back into the systems of some of those who drink it.

Of all the purifying processes of drinking water, boiling is the simplest. About twenty minutes vigorous boiling deprives the water completely of all living germs. But the flatness of boiled water, as well as the turbidity which the Chicago water commonly presents, renders filtration desirable, Frankland has found that sand or coke, or spongy iron, in layers of about six inches thickness, remove nearly, if not all micro-organisms from the water filtering through them, but that this retaining power decreases steadily in the course of weeks. As far as I have learned, most of the filters here in the market contain sand or charcoal, and as I have heen told by parties using them, many do not furnish water as clear after some weeks or months as they do at first. The layer of filtering material is neither thick enough nor sufficiently packed to retain all bacteria, and should besides be changed from time to time. One charcoal filter which I tested gave a clear water, containing, however, nearly as many germs as the original hydrant water.

A filter on a different plan, and which I have exam-

ined more minutely, is the Mallié Aerifilter (French patent), similar to the one devised by Pasteur's assistant, Chamberland. It consists of a cylinder, with conical end, made of unglazed white clay, screwed water-tight to the faucet, and surrounded by a protective glass cap. If there be sufficient pressure in the pipes, the water filters through this clay cylinder drop by drop, to the extent of some two to four gallons per day (in Chicago). All visible solid particles are left in the interior of the cylinder, in the form of a slimy coat, which should be washed out once in two to four weeks. The muddy washings from this cylinder gives one a rather exaggerated idea of the dirt we are forced to drink. The microscope shows it to consist of about half of living bacteria and brilliant particles (presumably spores), the other half being clay and sand, with occasional vegetable cells and fragments. The water furnished by this filter is of remarkable transparency. The very resi due in the filter shows that very few bacteria can have passed through into the water; but I cannot say that it is absolutely perfect, as would appear from a testimonial given this filter in the Municipal Laboratory at Paris. On testing the water, by allowing drops to fall from the filter into gelatine flasks, I have found that when the filter was well cleansed within some hours the water was entirely free from micro-organisms — but when the filter was left undisturbed for days and weeks, a few colonies were invariably obtained, usually less than one-tenth the number contained in the original water. There were, moreover, not so many varieties as in hydrant water —generally but one or two. I have some reason to think that most of these bacteria found in the filtered water did not pass through the filter, but that the very few germs which did pass through, or which possibly came from the air, multiplied to some extent in the film of water between the clay cylinder and the surrounding glass, for it is well known that even distilled water allowed to stand for hours harbors numerous bacteria. I judge so from the fact that after cleaning the surface of the clay cylinder with a sterilized brush and with water previously boiled, and readjusting the glass cap after purification by boiling water, the filtrate was usually free from micro-organisms for several hours. This multiplication of bacteria on the surface of the filter does not detract from its merits, because in a film of water containing as little organic matter as ours, no bacteria of parasitic habitat, and hence, at all dangerous, could multiply.

MEDICAL PROGRESS.

THE ACTION OF UNNA'S PLASTER-MULLS.—In his observations (*Deutsche medicinische Wochenschrift*, December 17, 1885) L. HOFFMAN refers especially to the gutta-percha plasters. These have advantages over the salve-muslins (Salbenmulle); they are permanent, adhesive, comfortable, cleanly, and are more active.

The boric acid plaster proved of value in leg ulcers. A new plaster, large enough to cover the hardened border of the ulcer, was applied daily; later, after the surrounding parts had become somewhat softened, it was applied to the ulcer only. The ulcer became gradually smaller, the last part being healed by a weak nitrate of silver ointment. Four cases are given, in all of which the result was favorable. In the treatment of bedsores this plaster also acted admirably.

Chrysarobin plaster (18 per cent. strength) gave excellent results in psoriasis. In its use there was no danger of the chrysarobin-conjunctivitis; and the erythema produced by the drug did not extend beyond the parts covered by the plaster.

In several cases of eczema in which the disease was dry and circumscribed, oxide of zinc plaster was employed and effected rapid cures. In the more severe forms the zinc and tar plaster was found efficacious. In obstinate cases naphthol plaster (10 per cent. strength) was tried with satisfactory effects. This last plaster proved useful also in a case of beginning lichen ruber.

Salicylic acid plasters are recommended for the treatment of infiltrated patches of eczema, also in verrucous and sclerous patches. This plaster also acts well in epidermal hypertrophies, as clavus and callositas. In clavus salicylic acid and mercury plaster is preferred on account of its being less painful. Salicylic acid plasters were found of value in the vegetable parasitic diseases, also in lupus and acne rosacea. The pain that the stronger salicylic acid plasters sooner or later give rise to, may be moderated by the use of those containing 15 per cent. of extract of cannabis indica.

The mercury and carbolic acid plaster gave good results in furuncles. It acts differently according to the stage of the lesion. If applied in the beginning, the furuncle is aborted; if suppuration has set in, the same continues, but the process is painless. The frequency of renewal of fresh plaster depends upon the amount of suppuration. This plaster acts equally well in other phlegmonous inflammations.—*American Journal of the Medical Sciences*, April, 1886.

COCAINE IN CIRCUMCISION.—DR. JOHN MADDEN, of Wisconsin records a case in which he used a 4 per cent. solution of muriate of cocaine in circumcision.

Four points, practically equidistant, were selected upon the line of the intended incision, the hypodermic needle inserted, and about one-fourth of a drachm of the solution was injected beneath the skin at each of these points. A piece of absorbent cotton was then saturated with the fluid, and placed in contact with the preputial mucous membrane. Testing the sensibility of the parts from time to time, by pricking with a needle, in about twenty minutes the sense of feeling was almost entirely abolished. The foreskin was then drawn forward, held between the blades of a pair of dressing forceps, and quickly ablated with a knife. The patient declared that the operation gave him no pain nor sensation of any kind, excepting in one small place on the left side. I noticed, however, that the solution had filled the subcutaneous tissue beneath this place. The mucous membrane

was next caught up, and quickly cut off with a pair of scissors. Its sensibility, though very much lessened, was not entirely destroyed, and the patient complained of some pain. The operation was completed by stitching the mucous membrane and integument together, the former growing more painful towards the end of the operation, while the latter preserved its anæsthesia.— *Therapeutic Gazette*, April 15, 1886.

THE SUGAR-FORMING FUNCTION OF THE LIVER.—In response to Hofmeister's recent adverse criticism (*Archiv f. exp. Path. und Pharm.*, xix) of the view that sugar was formed in the liver out of peptone, PROF. SEEGEN, of Vienna, gives the details of some experiments in which he found that the quantity of nitrogen yielded from 100 c.c. of fresh arterial blood mixed with fresh liver tissue, and treated with a current of air for some hours, was greater when a small quantity of peptone had been added. The quantities of nitrogen in six experiments were:

WITHOUT PEPTONE.	WITH PEPTONE.
0.113	0.300
0.050	0.105
0.043	0.092
0.114	0.252
0.140	0.216
0.070	0.159

The peptone and other proteids having been completely removed before the nitrogen was estimated, it must have come from the products of decomposition of nitrogenous materials and it appeared doubtless to him that in the presence of arterialized blood the liver cells split peptone into sugar and some crystalline nitrogenous product, and he believes that at least in the case of carnivorous animals, one of the chief duties of the peptone is to form sugar.

In a second paper Prof. Seegen gives three experiments on dogs by which he attempted to settle finally the vexed question whether a diet of cane sugar causes sugar to appear in the urine. He found both cane and inverted sugar in the urine in all three experiments.

In a third paper he brings forward elaborate arguments to prove that the production of sugar in the liver is not—in contradistinction to the production of glycogen—interrupted by inanition or increased by abundant carbohydrate ingesta, but is an independent and unintermittent function of the tissue changes.—*Archiv f. d. Gesam. Physiologie*, Bd. xxxvii, November 5, 1885.—*American Journal of the Medical Sciences*, April, 1886.

EMBOLISM OF THE AORTA.—DR. VINCENZO CAMMARERI, of Naples, has published a memoir upon Obliteration of the Abdominal Aorta, which is summarised in *Le Progrès Médical* (No 13). He has collected all the cases on record, starting from Barth's case in 1835 and Romberg's ten years later. In the majority the cause is embolism proceeding from the ventricle, the embolus being arrested at the bifurcation of the aorta, and leading to secondary thrombosis extending upwards—rarely above the level of the renal arteries—and downwards into the iliac arteries and their branches. The event is marked by the sudden appearance of complete and painful paraplegia. The sphincters are generally unaffected. Sometimes there is tetanic rigidity of the lower limbs; the reflexes and sensibility are abolished. Often in addition there are other symptoms—as hæmaturia, ischuria, suppression of urine, rachialgia, acute decubitus, etc. Whether a fatal result occurs rapidly or not depends upon the extent to which the vessel is obliterated; in some cases, owing to partial obstruction or to a certain amount of collateral circulation, life has been prolonged for several weeks, or even months. The paraplegic symptoms have been ascribed by some to anæmia of the muscles, by others to anæmia of the cord; but the writer demurs to the latter explanation, except in cases where the coagulation has extended high enough to block the lumbar arteries; but even here he thinks the paralysis may be explained by interference with the muscular nutrition. Experimental ligature of the lumbar arteries in the dog produces paresis of the hind limbs, but the paraplegia equally follows the infliction of the wound without ligature. The author then explains the muscular paralysis following upon obstruction of the aorta as being due to the absence of oxygen and the presence of an excess of carbonic acid in the tissues. In like manner he explains the absence of reflexes; whilst the occurrence of muscular rigidity in some cases is compared with cadaveric rigidity—attributable, that is, to coagulation of myosin, and not to over-excitability of the muscle. The same "asphyxial" condition of the tissues is held to account for the anæsthesia, whilst the symptoms of pain is attributed to irritation of nerve fibres from the presence of products of disintegration, the nerves being rendered excitable by imperfect anæmia or collateral hyperæmia. The lowered temperature, œdema, and gangrene are easily explicable by the stasis that is established, and the supervention of syncope from cardiac paralysis may be due to heightened arterial tension. The frequency with which aortic embolism is associated with mitral stenosis does not appear to be insisted on; but is easy of explanation, since it is especially in such cases that thrombi sufficiently large to block the vessel are found in the auricle.—*Lancet*, April 17, 1886.

DIFFERENTIAL DIAGNOSIS OF DISTENSION OF THE FALLOPIAN TUBES.—MR. JOHN W. TAYLOR points out what he thinks are the chief marks of similarity and difference between uterine myoma and tubal disease:

1. Menorrhagia may be common to both diseases, but in uterine myoma it is painless, in tubal disease it is very painful.

2. Moderate enlargement of the uterus (from 3 to 3½ inches) is present in tubal distension accompanied by hæmorrhage (as in most cases where metrorrhagia is a prominent symptom); an enlargement beyond this may generally be expected in myoma.

3. The tumor formed by distension of the Fallopian tube is always single or double, and is always posterior to the uterus; nodular myoma is usually multiple, and the situation of the outgrowths variable.

4. The tumor formed by a distended tube, even when chronic and quiescent, is always very tender to touch, whether that touch be from the examining finger of the surgeon, or from the passage of scybala through the rectum; a myomatous nodule, unless inflamed, is comparatively insensitive. Probably, for a similar reason, dyspareunia is a very general symptom of tubal disease, but is almost unknown in myoma.

5. The outline or shape of a distended tube is fairly constant, in possessing a longer and a shorter axis; that of nodular myoma is round or quite irregular.

6. The tumor caused by a distended tube varies in its firmness or consistency, and at some time or other will show signs of elasticity or fluctuation; that of nodular myoma remains hard.

7. Both a distended tube and myoma of the posterior uterine wall may sink lower in the pelvis by causing retroflexion of the uterus; but, apart from this, the former, although not adherent, tends to sink slowly by its own weight; the latter reaches a lower point only by increased growth.

8. When pregnancy occurs, the uterine enlargement being caused chiefly by the development of the muscular tissue of the uterus, a myoma of this tissue will be much more likely to be raised by the growing uterus than a distended tube, which is only adherent, and often but lightly, to its peritoneal investment.

The only other condition that is likely to be confounded with distension of the Fallopian tube is cyst or abscess of the ovary. A special form of cystic disease of the ovary is often, perhaps generally, combined with occlusion and distension of the tubes; and if the latter be correctly diagnosed in these cases, this is sufficient for every practical purpose. But ovarian abscess or cystoma of the ovary in an early stage, the associated tube remaining normal, needs rather careful differential diagnosis from a distended tube. I have found the chief point of difference to be this: that, in cyst or abscess of the ovary, a space can be found between the tumor and the uterus unoccupied by any swelling; in distension of the Fallopian tube, the tumor is continuous with the uterus. By this means I have on two or three occasions diagnosed a cystic condition of the ovary only, when tubal disease has been expected; a diagnosis which has been confirmed by operation.—*British Medical Journal*, April 17, 1886.

EFFECTS OF AN EXTENSIVE FRACTURE OF THE SKULL.—A case of extensive wound of the skull and brain is reported in the Russian *Herald of Forensic Medicine*. The patient was a man who had been struck by a piece of an anvil of about seventeen pounds' weight. The wound extended from half an inch above the concha of the left ear to the right parietal eminence. The fracture of the skull corresponded in length and position with the external wound. In many places it was splintered, the posterior edge of the fracture being raised above the level of the anterior edge. The whole wound was filled with crushed brain-substance, partly gray and partly white. There was both motor and sensory paralysis of the right arm. The power of sensation in the right leg was diminished; the pulse was 80 and the respiration 20; the temperature was also normal. The patient was fully conscious and in a peculiarly placid state of mind, being pleased with everything. He forgot, however, a number of abstract nouns and all proper names; his memory for numbers was also affected, and he had forgotten how to read. The wound was dressed with antiseptic bandages, and completely healed in fourteen weeks. During this time ten splinters were removed. The symptoms of amnesic aphasia gradually passed off. The memory for abstract nouns returned in about a fortnight. The placid humor passed away, and the man became decidedly irritable and suffered from insomnia and headache. The paralysis of the leg passed off during the first few weeks. Sensation returned in the arm and movement also, and after three months contraction occurred. After the lapse of eight months the man was still unable to read, and complained of constant headache and great feebleness of memory.—*Lancet*, April 17, 1886.

AN UNUSUAL CARDIAC LESION.—M. DÉJERINE made a communication, on Dec. 26, to the Biological Society of Paris, concerning an unusual cardiac lesion causing sudden death in two patients convalescent from typhoid fever. There were no cardiac symptoms during life. At the necropsy there was an absence of lesion, but examination with the microscope showed that the myocardium was broken up. Each fragment was constituted by an isolated muscular cell. There was neither fatty, nor putrid, nor pigmentary degeneration. In both cases the lesion of the myocardium consisted in a separation of the intercellular cement of Eberth, which in a normal condition unites the cells of the cardiac fibres. The phenomenon is observed in patients in an asystolic condition. It is due to the fact that the intercellular cement is dissolved by sarcolactic acid, which is formed in great abundance. There were no bacilli in the myocardium. Landouzy and Renaut have described this lesion in the myocardium subsequent to pericarditis.—*London Medical Record*, March 15, 1886.

SUTURES IN THE HEART.—A paper of Block communicated to the eleventh congress of the German Surgical Society, 1883, on "Wounds of the Heart and their Cure by Sutures," having attracted the attention of DR. PHILIPPOFF, of Kharkoff, he determined to make a series of experiments on dogs and rabbits for the purpose of satisfying himself of the truth of Block's assertion that sutures may, under certain circumstances, be applied to the walls of the heart. Though the Russian observer has not as yet concluded his investigations, he has published a preliminary note in the *Russkaya Meditsina* (No. 11) in which he states that the hearts of some animals will bear transfixion with a fine trocar or a needle, also that wounds of the heart in animals may be cured by means of sutures, but by no means always. He found, too, that the pericardium might be opened in dogs without any serious effects, but that wounds of the large vessels at their exit from the heart were invariably fatal.—*Lancet*, April 24, 1886.

THE
Journal of the American Medical Association.
PUBLISHED WEEKLY.

THE EDITOR OF THIS JOURNAL would be glad to receive any items of general interest in regard to local events, or matters that it is desirable to call to the attention of the profession. Letters written for publication or containing items of information should be accompanied by the writer's full name and address, although not necessarily to be published. All communications in regard to editorial work should be addressed to the Editor.

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Address
JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION,
No. 65 RANDOLPH STREET,
CHICAGO, ILLINOIS.

SATURDAY, MAY 15, 1886.

AMERICAN MEDICAL ASSOCIATION, THIRTY-SEVENTH ANNUAL MEETING.

The thirty-seventh annual meeting of the American Medical Association was held in the Exposition Building at St. Louis from the 4th to the 7th of May inclusive. The number of delegates and members in attendance was unusually large, the registration showing about 1,100 present. The facilities for registration were admirable, and everything under the care of the Committee of Arrangements well planned and judiciously executed. The address of welcome by the Mayor of the city was appropriate and cordial, and the Chairman of the Committee, Dr. Le Grand Attwood, discharged his duties to the satisfaction of all. The President, Dr. Wm. Brodie, of Detroit, delivered his Address in good style, and was listened to with close attention to its close. It was given to our readers in full last week. Following the President's Address, came the report of the Committee on the Preliminary Organization of the Ninth International Medical Congress. The Committee had held a regular meeting the day previous in a parlor of the Lindell Hotel, and after learning the progress making by the Executive Committee of the Congress, also in session at the same time, they prepared a brief report for the Association. Dr. J. S. Lynch, of Baltimore, Vice-President of the Committee on Organization, presented the report to the Association, which simply stated that after mature deliberation and several full meetings of the Committee, they had adopted the *Rules* necessary for the organization and business of the Congress, appointed the general officers of the Congress, the chief officers of the Sections, and a local Committee of Arrangements at Washington; and as under the Rules, the President, Secretary-General, Treasurer, and Chairman of the Finance Committee of the Congress and the Presidents of the several Sections constituted an Executive Committee of the Congress with full power, all the further business and management of the Congress, including the filling of any vacancies that might now or hereafter exist, had been transferred to such Executive Committee.

The report was, on motion, received, and adopted with a decided degree of enthusiasm, and without an audible negative vote. As the very large hall contained at the time about 1000 delegates, representing the Profession of almost every State and Territory of the country, it ought to satisfy all parties at home and abroad, that the medical profession of these United States, in whose name the Congress was invited to meet in Washington, on the first Monday of September, 1887, is earnestly and unitedly engaged in making every necessary arrangement for the cordial reception of a great and truly International Medical Congress, at the time and place appointed.

The harmony, good order and enthusiasm thus exhibited during the first session was continued throughout all the subsequent three days' proceedings and to the hour of final adjournment. The several Sections were also supplied with a large number of papers and interesting topics for discussion, and the quality of their work will compare favorably with that of any of the general organizations of specialists in this country. The full record of the proceedings, as furnished by the Permanent Secretary, will soon reach us, and will be given to our readers without further delay.

DR. DICKINSON'S WORK ON RENAL DISEASES.

We have before us two copies of the third volume of DR. HOWSHIP DICKINSON'S work "On Renal and Urinary Affections;" the one published for the author by Longmans, Green & Co., of London, with the notification on the title-page that *all rights are reserved*; the other a mutilated reprint, a pirated copy of the result of years of earnest faithful work. The latter is issued by a New York firm, as the August, 1885, number of "Wood's Library of Standard Medical Authors." The English edition contains 689 pages of reading matter; the mutilated edition 337 pages. Nowhere in the American edition (though we must blush to call such an edition "American") is there any reference to the fact that it is the *third* volume of a work destined to become classical; but it is issued as though it is the complete work of Dr. Dickinson.

No work in any language has hitherto appeared which contains so much valuable matter in regard to

renal and urinary affections as the work of Dr. Dickinson. He has been more than a decade in preparing the book for publication, and anyone who will give himself the pleasure of reading it will be convinced that the time has been well spent. He has brought before the medical public a vast record of experience, and has embodied in the work a large number of most valuable records of clinical cases, occurring in his own practice and in that of other observers. While at first blush it might seem that the subject could have been treated of in a much smaller number of pages, a careful survey of the book will show that it is far from being a diffuse work. The clinical cases given cannot be looked upon as unnecessary padding; without exception they are interesting and valuable, and the reader will often wish that the author had given more cases. The illustrations, as a rule, are good, and well represent what is intended to be shown. While we are patriotic enough to wish that such a book could have been the work of an American author, we are not the less most willing to say that we must congratulate the profession on being able to obtain this monument of painstaking work and rich experience.

In the mutilated reprint of this volume the American publishers have added the following note to the author's preface: "The numerous cases cited in detail in the English edition of this volume have been omitted in this edition in order somewhat to reduce its size. It will be perceived that the text of the work has been so prepared that this omission in no degree interferes with its continuity, nor does it limit its authority." Whether this is true will be seen later. But the first question that arises is, Where have the reprinters obtained the medical education and authority that entitles them to abolish a large portion of a valuable book, without so much as "by your leave" to the author, and say to the profession: We now give you an *edited* copy of Dr. Dickinson's work; the original contains a large amount of extraneous matter, but we have cut this out, and at the same time retained the continuity and authoritative tone of the book? The answer is not direct, and may be read between the lines of the announcement quoted above: Here is a good book by a foreign author, but it is too large for our "Library of Standard Medical Authors;" foreign authors have no rights in America that we should respect, the book is too big, and while we are pirating it bodily we may as well cut it to suit ourselves. Besides, very few of those who get our "Library" will buy the original work, and they will never find out that anything of value has been omitted.

And now as to the omission which in no degree interferes with the continuity or limits the authority. In the first place *eleven* illustrations are omitted in the mutilated reprint. In the chapter on Renal Calculus, in speaking of ulceration of calculi into the stomach, is a quotation from Rayer, of almost half a page, which has been omitted altogether. In the chapter on Chyluria thirteen and one-third consecutive pages of clinical reports have been omitted, in which, in the original, are two valuable tables. In the chapter on Intermittent Hæmaturia or Hæmo-globinuria we find that 39½ pages have been omitted, with a valuable table; though of course such a small omission "in no degree interferes with the continuity" of the book. In the chapter on Hæmaturia are records of five cases showing the association in infants of bloody urine with unsuitable food. These records are omitted from the reprint, but the paragraph following the omission commences, *as in the original*: "The circumstances of these cases," etc! In the chapter on Suppression of Urine is a full record of a case quoted from Mr. Hutchinson, and a few pages further on the case is referred to by page reference. The American editors (!) have omitted the record of the case, but guilelessly refer to it. On the same page is a reference to a case reported by Dr. Todd, but the record of the case is omitted in the revised American edition. Dr. Dickinson quotes in full a case from Taylor, of a man who had suppression of urine after taking two drachms of corrosive sublimate. The *revisers* say, in a rather lonesome looking paragraph: "Taylor relates the case of one John Wright, 38 years of age, who swallowed two drachms of corrosive sublimate, and an hour afterwards was received into Guy's Hospital." While it was perfectly proper that John Wright should have been received into Guy's Hospital after taking two drachms of corrosive sublimate, it would have been somewhat to the point to have said why he was carried there, and what became of him subsequently. Taylor says that there was complete suppression of urine, that he survived for four days, and, what is especially interesting, the record of the autopsy is given. But the professional experts who omitted this case (without interfering with the continuity of the work) evidently thought it sufficient to give only the name and age of the patient, the amount of the drug taken, and the name of the hospital.

We have already said that preservation of continuity and non-limitation of authority demanded that eleven cuts should be omitted. Would that some consideration had demanded that many more should have been omitted from the mutilated edition. Dr. Dickinson would doubtless be surprised to see that

the ingenuity of the *editors* has added many things to his illustrations. Emboli, thrombolic deposits, Florida moss, bee-line capillaries, and scroll-work have been generously supplied, doubtless at considerable additional expense to the editors. One large cut is labeled "Tuberculous Kidney." It would be more in place in a horticultural guide as a hybrid sun-flower.

On summing up the total loss we find that eleven illustrations and *one hundred and fifty pages* (plus) have been omitted from the American edition! True, the pages omitted are reports of cases; but they are valuable and necessary for the proper comprehension of the subject. Dr. Dickinson is not a man who would pad a volume to make a show, and he is too busy to write for the purpose of killing time. The author says in his preface: "I am assured that much of any interest which may be found will be in the clinical and pathological cases;" and the intelligent reader will endorse the assurance. The editors, however, on account of a superior knowledge and acumen, have decided that the cases may as well be left out! If such things can be the time cannot come too quickly when an International Copyright law will lay its hands on those who seem to be destitute of all moral sense and obligation.

THE INTERNATIONAL MEDICAL CONGRESS.

A meeting of the Executive Committee of the Ninth International Medical Congress was held at the Lindell House, in St. Louis, on the 3d inst., at which a large majority or the Committee were present.

Reports of sub-committees were presented and much progress was made towards completing the details of the preliminary organization. Dr. N. S. Davis, of Chicago, was elected unanimously President of the Congress to fill the vacancy occasioned by the death of Prof. Austin Flint. Dr. J. A. Grant, of Ottawa, Canada, was elected Vice-President in the place made vacant by the resignation of Dr. R. Palmer Howard, of Montreal. J. B. Hamilton, M.D., Supervising Surgeon-General of the U. S. Marine Hospital Service, was elected Secretary-General of the Congress to fill the place made vacant by the election of Dr. Davis to the Presidency.

James F. Harrison, M.D., Chairman of the Faculty of the University of Virginia and Professor of Medicine, Obstetrics and Diseases of Women, was elected President of the Section of Gynecology; J. H. Callender, M.D., Professor of Physiology in the Nashville and Vanderbilt Universities, Tennessee, President of the Section of Physiology; A. B. Palmer, M.D., LL.D., Professor of Pathology and Practical Medicine in the University of Michigan, President of the Section of Pathology; and E. Williams, M.D., of Cincinnati, President of the Section of Ophthalmology. In compliance with the earnestly expressed wish of both the otologists and laryngologists, the latter were given a separate Section, with Wm. H. Daly, M.D., of Pittsburgh, Pa., President, and Wm. Porter, M.D., of St. Louis, Mo., Secretary.

H. O. Marcy, M.D., of Boston, at his own request, was transferred from the Presidency of the Section of Collective Investigation, Nomenclature, Vital Statistics and Climatology, to the Vice-Presidency of the Section of Gynecology, and the vacancy occasioned by this transfer was filled by the unanimous appointment of Albert L. Gihon, M.D., U. S. N., a man eminently qualified to fill the place.

These important appointments, with much additional work in regard to details, will enable the Committee at an early day to issue a second circular giving the Preliminary Organization of the Congress complete, including the foreign officers required by the Rules previously adopted, and such additional information as can be furnished by the Local Committee of Arrangements at Washington.

THE VIRGINIA BOARD OF EXAMINERS.

The report of the Virginia State Board of Medical Examiners, which is published in the May number of the *Virginia Medical Monthly*, will be of considerable interest to State medical examiners generally, and to all others who hope for a higher standard of medical education in this country. The State legislatures, one after another, are passing medical practice acts, and we may now hope that within a very few years there will be an efficient board in every State.

About a year ago we took occasion to notice the efficient work done by the Virginia Board. At a meeting of this board, on April 7, there were thirty-four applicants; of these, twenty-five passed the examinations, one withdrew and eight were rejected. Up to this time, then, about one hundred graduates have applied for licenses, and sixty-six have succeeded in passing the examinations.

Of the examinations, which are written, we may say that while they are not unnecessarily severe they seem to be unnecessarily long, and tend to be too much tests of physical endurance. For example, there were six questions in chemistry, each with subdivisions; eight questions in anatomy, each one with subdivisions; five in hygiene, each with subdivisions; eight in physiology; fifteen in materia medica and therapeutics, some with subdivisions; six in obstet-

rics; five in practice of medicine, each with tedious subdivisions; and twenty in surgery, the last of which is, "Describe the methods of resuscitating the drowned?" Now, the plan of the examination announces that "the applicant is required to answer at least three-fourths of the questions satisfactorily, and to show a fair general knowledge of all the branches upon which he is examined." The applicant may make only 33⅓ on a given branch, but must aggregate 75 per cent. of the entire questions. We notice that "some of the best examination papers that were presented kept the gentlemen busily at work from 10 or 11 o'clock Wednesday morning, till late hours at night each day until Friday and even Saturday." It would seem that the examinations might be quite thorough with fewer questions and a limited number of hours. We can scarcely go amiss in saying that there are very few men in active practice who could answer 75 per cent. of the questions within two days of twelve hours each. It seems rather questionable if an examining board should ask such a question as "Give the anatomy and function of the lymphatic system," when physiologists and anatomists are not at all agreed as to the answer. It is probable, too, that the student and examiner might differ as to the source from which the heart receives its nervous supply, and as to the phenomena of pancreatic digestion. So, also, in describing the management of shoulder presentations; some obstetricians are positively at variance regarding the management of these cases. However, the fault that we find is in regard to the number of questions. It is better to be too severe than so lenient as to admit an unqualified man.

SOCIETY PROCEEDINGS.

AMERICAN SURGICAL ASSOCIATION.

Seventh Annual Session, held in the Reading-room of the Army Medical Museum, at Washington, April 28, 29, 30 and May 1, 1886.

(*Concluded from page 528.*)

FRIDAY—APRIL 30—THIRD DAY.

MORNING SESSION.

THE PRESIDENT IN THE CHAIR.

DR. T. F. PREWITT, of St. Louis, read a paper on

TRAUMATIC ANEURISM OF THE INTERNAL CAROTID ARTERY.

He first referred to those cases of spontaneous aneurism of the internal carotid artery which are found in literature and, the frequency with which this lesion had been confounded with cynanche tonsilaris. He had been unable to find more than one reported case of traumatic aneurism of this artery. This was reported by Dr. Wm. T. Briggs, of Nashville. The aneurism in that case followed a stab wound and was operated on successfully.

Dr. Prewitt then described the following case: E. J., colored, 17 years of age, was shot by her husband, early in January, 1885. The weapon used was a revolver carrying a No. 32 ball. The shot was fired at a distance of two feet and entered the cheek over the malar bone, ranging backwards. There was some profuse hæmorrhage at the wound of entrance. There was no wound of exit. The bleeding was controlled by compression. There was hæmorrhage from the ear at the time, and this recurred on two or three occasions. For some time after the accident the patient stated that there was some hæmorrhage from the mouth and nose on rising in the morning. There was some swelling at the time which gradually increased until April the 2d, when she was seen by the speaker. It then projected into the pharyngeal cavity and rested against the uvula, and extended externally from the anterior petrous portion of the temporal bone to the hyoid bone. The swelling pulsated in every direction and gave thrill and bruit. Immediately after the accident there was paralysis of taste and of the right side of the tongue; this continued. Pressure upon the carotid artery arrested the pulsation in the tumor. There was no difference in the pulsation of the two temporal arteries, the pupils were equal and respond normally to light. There was persistent headache with sounds in the ears, which was increased by lying upon that side. The voice was greatly interfered with, owing to paralysis of the right vocal cord. The appetite was poor and the patient emaciated. She was unable to swallow solids and fluids regurgitated when the attempt to swallow was made.

With this history and with these symptoms it was decided that there was aneurism of the internal carotid artery, and that the vessel had been wounded near the carotid foramen, for nowhere else are the artery and nerve in such intimate connection.

It was determined to at once ligate the common carotid artery. The usual incision was made and the dissection continued until the artery was exposed. A silk ligature was passed from behind forwards. The vessel was then lifted, to be sure that the pulsation was arrested before the ligature was applied. Finding that it was, the vessel was then tied. The pulsation was at first arrested, but in a few minutes it could be again felt. In the absence of all precedent it was concluded to extend the incision upwards in front of the tragus and determine the feasibility of opening the sac and tying the distal end. This was a forlorn hope, for the diagnosis was that the aneurism was seated just external to the carotid foramen. An incision was then made below the ear and extended upwards back of the ear. A cautious dissection revealed the fact that the sac filled all the space between the mastoid process behind and the condyles and ramus of the jaw in front. It extended to the base of the skull, to which it was closely adherent.

It was therefore impossible to reach the artery in that direction. Further attempts were abandoned, the wound was closed, a drainage-tube inserted and an antiseptic dressing applied. During the following seven days the temperature varied between 101° and 103°. On the eighth day, there was some hæmorrhage from an opening near the angle of the jaw. This was repeated and she spat up some blood on the following day. Examination showed a little coagulum at the angle of the jaw, which was removed and the left forefinger thrust into the opening. No coaglum could be felt within the sac. The attempt to detect the entrance of the artery with the finger failed. In order to avoid the hæmorrhage which would follow the removal of the finger the sac was stopped with lint treated with iodoform. This controlled the bleeding. The patient gradually became weaker and died on the twenty-fifth day after operation from exhaustion. Ten days after the sac was stuffed, epileptiform convulsions involving the facial muscles and the flexors of the forearm and hand appeared. These continued at intervals until her death.

The post-mortem examination showed the ball in the posterior part of the sac. The opening of the carotid artery was found close to the carotid foramen and seemed blocked up with clot. The blood-vessels of the membranes of the brain were congested, particularly on the right side. The inferior petrosal and lateral sinuses were filled with thrombi up to the torcular Herophili.

The differential diagnosis of aneurism of the internal carotid artery from those of other arteries in this situation were then considered. As regards operation in this case compression and ligation were considered, but compression was rejected on account of the urgency of the symptoms. The patient was not a suitable one for this mode of treatment, being ignorant and irritable, and unfitted to endure the annoyances of this method of treatment. Neither were skilled attendants available.

Dr. J. Ford Thompson, of Washington, had never seen a case of aneurism of the internal carotid artery, but should think that the diagnosis would not be especially difficult. It would perhaps have been better if the operation of Syme had been performed, or, if necessary, the suggestion of Guthrie might have been carried out; that is to make a section of the ramus of the jaw, to afford more room for dissection. As this lesion is followed by certain death, his opinion is that it is the duty of the surgeon to perform the old operation, cutting into the sac and ligating the vessel at both ends.

Dr. William T. Briggs, of Nashville, said that the case which he reported at a previous meeting of the Association was that of a young man stabbed in the neck. Five weeks later the patient presented himself at the clinic with a swelling of the neck presenting all the evidences of aneurism. He considered it to be a small aneurism of one of the branches of the external carotid artery that could be readily reached and ligated. He made an opening large enough to permit the introduction of the finger, and at once found that the condition was more serious. The hæmorrhage was controlled by stuffing a sponge into the sac and the common carotid ligated. When the sponge was removed, the hæmorrhage was as free as before. The opening in the sac was then enlarged, the opening of the artery having been found and controlled by the finger. The vessel was then hooked up and a ligature applied above and below the sac. The patient recovered and is still living in perfect health. He thinks that in all cases where it is possible, the operation of Syme should be employed.

Dr. D. Hayes Agnew, of Philadelphia, said that about three years ago, a woman presented herself at the University Hospital with a tumor as large as an orange just beneath and behind the angle of the jaw. There was also a projection into the pharynx. This tumor had grown slowly for eight months, and was attributed to a blow on the side of the head. He considered it a case of aneurism of the internal carotid, and ligated the common carotid above the omohyoid muscle. The pulsation was diminished, but it could still be felt. He attributed this to the communication with the external carotid artery. He then tied the superior thyroid and the lingual. This stopped all pulsation. The patient did well for two weeks, when pulsation again returned. Pressure on the carotid of the other side controlled the pulsation, and he then placed a ligature around the primitive carotid of that side. During his absence from the city, ulceration took place and a gush of blood into the pharynx occurred. The resident stuffed the cavity, but the patient died eight days later, apparently from septic poison. If he had been present when rupture occurred, he had determined to have laid the sac open and have tied above and below. From the history of these cases he believes that in this condition the operation should be a formal one of section of the jaw, and then proceed to ligate above and below the sac.

Dr. A. Vanderveer, of Albany, said that in December, 1882, a man 42 years of age, a farmer, was sent to him with a swelling of the neck which was diagnosed to be an aneurism of the internal carotid artery. It was attributed by him to forced motion of the head to one side which was required in a certain part of his work. It was determined to first try compression. This was faithfully carried out, and at the end of six days the swelling was much diminished and the tumor in the pharynx seemed more solid. He then went to his home, but returned one month later, the previous condition having returned. Compression was again tried, and at the end of five days there was a marked diminution in the size of the tumor. He again returned home and continued in apparently good health for four or five weeks, when he suddenly complained of a severe pain in his head and fell dead. An autopsy was made, but no satisfactory explanation of his death could be found. The physician was inclined to attribute it to apoplexy.

Dr. L. McLane Tiffany, of Baltimore, said that in the case reported by Dr. Prewitt there was no room for a distal ligature. In this case, however, it might have been possible to apply a compress, pressing the artery against the base of the skull.

Dr. T. F. Prewitt agreed with those who had taken part in the discussion that the old operation is

the proper one for traumatic aneurism where it is possible to apply it. In this case this could not be done. If the circumstances had been suitable, he should have tried compression, but the symptoms were too urgent to permit of this.

DR. ROSWELL PARK, of Buffalo, exhibited a

TRACHEOTOMY TUBE.

This was a bivalve instrument, the blades opening laterally and provided with an obturator permitting its ready introduction. The great advantage claimed for the instrument was the ease with which it could be cleansed.

DR. PARK then reported a case of

LIPOMA TESTIS, OR A LARGE ACCUMULATION OF FAT IN THE TUNICA VAGINALIS.

Lipomata of the spermatic cord are rare enough to always attract attention, but lipomata of the testicle are of such exceeding rarity that, believing that he had had a case which deserved this designation, he desired to put it on record.

J. P., age 40, was first seen in September, 1885. For eighteen months the patient had noticed a slow but continuous enlargement of the right testicle. This was almost painless, but caused inconvenience by its weight. At this time the tumor had reached the size of a cocoanut.

Examination showed the scrotum to be filled with a large mass, the testicle being crowded into a small space at its upper part. This mass was solid, yet soft and not tender. Obscure fluctuation was noticed, but no fluid was obtained upon explorative puncture. The patient's general appearance excluded all idea of malignancy. The scrotal integument moved with perfect freedom over the tumor.

On October 4 the patient was operated on. A free incision through the tunica vaginalis revealed a mass of densely packed fat which was slightly adherent, but was turned out without difficulty. On separating the lobular masses by the fingers, the right testicle was found not merely imbedded in its upper part, but incorporated by apparently intimate tissue connection. It was supplied with blood both from the testis and from the cord. The cord seemed to pass for a distance of two inches through the mass before reaching the testicle. No evidence of pus or present hernia could be found, the ring and canal being no larger than on the opposite side. Finding the fibrous trabecula and blood-vessels radiating from the testicle to the fatty mass so numerous and distinct, it was decided to remove the whole *en masse*, which was done. The patient recovered without incident. After removal the mass weighed three pounds. It was not possible to decide the exact origin of the fatty growth, whether it had started from the cord or from the testicle.

The literature of this subject is very meagre, the author being able to find but three similar cases on record. Kimball (*Boston Med. and Surg. Journal*) and Jobert (*Gaz. Méd. de Paris*, 1850) report authentic cases. Deguise also reports a case (*Ann. de la Soc. de Chir.* ix) in which the tumor was as large as an adult head, and had been growing for twelve years. Numerous authors state that lipoma of the cord may extend downwards and may spread over testicle, and it is possible that this case may have begun in that way, but there was nothing to indicate such an origin. The rarity of the lesion, coupled with its pathological interest and the obscurity which attends the diagnosis, was the author's reason for presenting the case to the Association.

DR. PARK also read a paper entitled

NEPHRECTOMY ON A PATIENT TWENTY-THREE MONTHS OLD.

B. B., born October 4, 1883, appeared at birth to be perfectly healthy. During the following winter the nurse noticed an enlargement in the right side of the abdomen, and the attention of the attending physician was called to it.

July 31, 1885, the attention of the writer was called to the child, who appeared to be perfectly healthy. There was a history of steady enlargement of the growth. The bladder was examined with the sound, but no evidence of calculus was found. The urine contained numerous crystals of triple phosphates, otherwise normal. Examination of the abdomen revealed a firm resisting tumor about the size and shape of the fœtal head at term, occupying the right half of the abdominal cavity. A portion of the fluid was removed and examined, with negative results. The diagnosis was fibro-cystic tumor of the right kidney, probably of congenital origin. Five weeks later the tumor was found to have increased decidedly in size, and operation was decided upon.

The operation was performed September 15, 1885. An incision was made in the right semi-lunaris; slight adhesions were found. The peritoneum covering the growth was incised and the tumor shelled out without much difficulty. The pedicle was tied and dropped into the abdominal cavity. On the twelfth day the patient was removed to his home, and now, seven months after operation, is perfectly well. The tumor proved to be a fibro-cystic tumor of the right kidney, the cystic element predominating. Immediately after removal it weighed four pounds.

In searching the literature of this subject, the writer had been able to find but three cases in which the age of the patient approximated that of the one now reported. These cases were respectively, one, 2¼ years, recovered; one, 2½ years, died; and one at 11 months, died. The case reported therefore appears to be the youngest who has survived nephrectomy, he being 23 months old at the time of operation. The abdominal incision in this case was made not from choice but from necessity, the tumor being altogether too large for extraction through a small opening in the lumbar region.

DR. W. W. KEEN, of Philadelphia, then read a paper on

STRETCHING OF THE FACIAL NERVE.

He first related a recent case in which he had done the operation, and added a table of the twenty-one cases so far reported.

His own case was that of a woman, sent to him by Dr. Sinkler, aged 48 years. She was admitted to the Woman's Hospital April 1, 1886. She had had severe attacks of nervous trouble in early childhood,

and had twice been paralyzed. Five years ago coincident with menstrual disturbance her right eyelid began to twitch, and in six months the whole face and the platysma were incessantly in spasm, which was increased by mental or muscular effort, such as speaking or being spoken to. Later this was accompanied with constant pain.

In June, 1884, the right infra-orbital had been resected with partial relief for only six weeks. Not long after the twitching extended to the right side and leg.

April 2 Dr. Keen cut down on the seventh nerve by an incision behind the right ear, displacing the parotid gland forwards and getting access to the nerve just after its exit from the stylo-mastoid foramen. Imbedded in connective tissue, it required considerable search and dissection to lay bare the nerve in this case. The exact point of its entrance into the parotid was quickly discovered by a very weak current of electricity, one electrode being placed on the cheek and the other consisting simply of the wire being touched at successive points from above downwards. The trunk was then laid bare and stretched, the force being estimated at four or five pounds, just short of lifting the entire head. Total facial palsy followed, with relief not only from the spasms in the face and neck, but also of that in the side and leg. The wound healed in four days, when the sutures were removed, the highest temperature having been 100.4°. The operation was done twenty-five days ago, and so far there has been no return of the spasms and the patient was delighted with the the result, the palsy being a grateful relief from the spasm.

Dr. G. B. Massey had examined the case electrically and found the reactions of degeneration. The later history of the case will be reported at a subsequent meeting.

Next a table of the other twenty cases so far reported since Baum, in 1876, first stretched the facial nerve, was given, with remarks upon the operation. The paralysis always disappears no matter how severe the nerve has been stretched, and while the spasms often return, they are lessened in severity. In fourteen of the cases the spasms recurred within a week in three cases. In five others, absolute relief extended over three weeks to five months, the improvement in four of them lasting much longer. In the remaining six cases the relief extended from four months to a year, with improvement still existing in three of them. As a palliative operation, therefore, it would seem to be indicated; while of the five cases reported "cured," two had continued three months, three had remained well for from two and a half to five years. Two of the twenty-one cases were too recently reported to give the final results.

The speaker preferred Baum's method of operating decidedly to Heuter's, in which the nerve is reached through the parotid gland. He bandages the lower jaw and gives fluid food for three or four days in order to keep the parts quiet while healing. He called attention to two cases in which a palsy existing prior to the operation was benefited by the nerve-stretching, both electrical and voluntary control being obtained to some extent, and he suggested that in persistent facial palsy, stretching of the facial nerve be tried as a therapeutic operation.

Dr. C. H. Mastin, of Mobile, read a paper on

SUBCUTANEOUS DIVISION OF URETHRAL STRICTURE.

The history of the operation for external urethrotomy was first considered, and next was described the various methods which have been proposed for its performance. The objections to these were then gone into at length. The main objection to most of them is that they leave an open wound in the perineum to heal by granulation. External urethrotomy is called for only under special circumstances. It has been laid down as a rule that where water can escape through a stricture, the surgeon should always by patience, be able to get an instrument through the stricture. The speaker thought that there were exceptions to this rule.

The indications which render the operation necessary are:

1. The impossibility of passing a sound into the bladder through the urethral canal, where a firm organic stricture blocks up the urethra and where dilatation or internal urethrotomy are not available.

2. In cases where a tight stricture has ruptured, and an abscess has formed. Under such circumstances it is necessary to open the abscess and it may be well to carry the incision further and lay the stricture open.

3. Certain cases of old tight stricture complicated with urethral fistulæ, through which urine is passed in the act of urination. In almost all these cases, however, as soon as the lumen of the tube is restored, the fistulas heal. The writer prefers internal section in such cases.

4. A most important indication which may arise is rupture of the urethra by a blow, the effects of which are violent and severe.

5. Traumatic stricture, that is where the stricture is the result of direct injury to the urethra. In these cases ordinary dilatation is inefficient and internal urethrotomy is often of little or no benefit.

6. A calculus impacted behind a stricture may be an indication for external section.

7. When extravasation of urine has occurred from sudden rupture of the urethra, and which is followed in a short time by extensive sloughing of the penis, scrotum and groin.

8. The last indication is one in which Mr. Reginald Harrison recommends combined external and internal urethrotomy with the introduction of a large tube.

Having decided that external section is required, the question is, which operation gives the best prospects of success and is most readily performed. The claims of the operations proposed were then considered.

The author next described the operation which he had employed with entire satisfaction since 1868. The incision is a very small one, made anterior to the stricture. The patient, being properly prepared, is put in the ordinary position for cystotomy. An anæsthetic is administered; a tube, open at both

ends is then passed down to the stricture; this protects the walls of the urethra and puts on the stretch the face of the stricture. The tube is filled with small whalebone probes, and one after another is tried with the hope that one will enter the stricture. This being accomplished, the tube and probes are removed. The probe engaged in the stricture is then pushed forward and a Wheelhaus sound carried down to the stricture; an incision one-half inch in length is then made in the anterior wall of the urethra on the groove of the sound; the sound is withdrawn a short distance and the whalebone bougie sought for as it passes through the stricture and drawn out of the original wound. Over the probe a gorget is passed, having its blade upwards; this is passed downwards, cutting the stricture on its superior face; a catheter is then passed along the entire urethra into the bladder and the urine evacuated. The stricture is then examined, to determine whether or not any points of narrowing still remain. If they are, they are divided.

If, in the first instance, it is found impossible to pass the whalebone bougie, a staff with a deep groove is passed to the stricture, and a small opening made; a whalebone bougie is then passed through the stricture, and the operation is complete, as in the previous case. After operation, a full-sized ordinary soft catheter is introduced to the prostratic portion of the urethra, but not into the bladder; the patient is put to bed, on the left side, and directed to push the catheter into the bladder when the desire to urinate is felt, and to withdraw it beyond the neck of the bladder, but not through the stricture after the urine has been passed. This is used only for the first twenty-four or thirty-six hours, to protect the wound from the contact of the urine. The speaker was opposed, on general principles, to allow a catheter to remain in the bladder; at the end of the time mentioned, the catheter is dispensed with. Immediately after the stricture has been incised and the calibre of the urethra restored, the external wound is closed with three fine pins passing sufficiently deep to grasp the walls of the urethra; these are removed in from four to six days. In the course of eight or ten days the patient is able to return to his work. The maximum calibre of the urethra is restored by the use of graduated sounds.

The advantages of this operation are: the short time of confinement for the patient; the freedom from hemorrhage: the quick union by primary adhesion; and the small amount of cicatricial tissue left.

DR. DUNOTT'S experience in dealing with so-called impermeable or impassable stricture has not been small; he had been able to deal with them even when there was great induration, almost without exception by the ordinary internal urethrotomy operation. In fifty or sixty cases seen within the last twelve years, he had been compelled in but one or two instances to perform external section. He thought the main reason that external urethrotomy is so frequently necessary is absence of patience on the part of the surgeon. It seemed to him almost without exception that where one drop of urine will pass through the urethra, a guide can be gotten in, provided the surgeon has the patience to wait for it.

DR. J. EWING MEARS offered an amendment to the By-Laws, providing for the appointment of a committee, of which the President shall be chairman, to have charge of the preparation of the scientific work of each session. Laid over until the next meeting.

THE PRESIDENT announced the following committee on the proposition looking to the formation of

A CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS:

Drs. C. H. Mastin, Charles T. Parkes, J. Ford Thompson, J. Ewing Mears, and N. Senn.

The following were elected

OFFICERS FOR THE ENSUING YEAR:

President — Hunter McGuire, M.D., Richmond, Virginia.

Vice-Presidents — T. F. Prewitt, M.D., St. Louis, and J. W. Gouley, New York.

Secretary — J. R. Weist, M.D., Richmond, Ind.

Recorder — J. Ewing Mears, M.D., Philadelphia.

Treasurer — P. S. Conner, M.D., Cincinnati.

Council — Drs. Hunter McGuire, John S. Billings, L. McLane Tiffany, R. A. Kinloch, and Moses Gunn.

The following were elected

HONORARY MEMBERS:

Foreign — Sir William MacCormac; *American* — Prof. Henry J. Bigelow.

Active Members Elected — Drs. H. H. Mudd, St. Louis, and Joseph Ransohoff, Cincinnati.

Time and Place of Next Meeting — The second Wednesday in May, 1887, at Washington.

CHICAGO MEDICAL SOCIETY.

Stated Meeting, May 3, 1886.

THE PRESIDENT, E. J. DOERING, M.D., IN THE CHAIR.

DR. M. P. KOSSAKOWSKI exhibited a case of

DOUBLE HARE-LIP AND CLEFT PALATE IN AN INFANT.

He promised a subsequent report of the case.

DR. H. GRADLE read a paper on

PURE DRINKING WATER.

(See page 544.)

DR. LONG asked if it is demonstrated whether the bacteria in our dringing water comes from the sewerage or from the air.

DR. L. CURTIS said there is no doubt that water absorbs a great number of bacteria from the air, and that these may gain entrance into the circulation through the digestive tract as well as through the respiratory tract. He said there is no doubt of the possibility of malarial germs being introduced into the system by means of drinking water.

DR. R. TILLEY wished to know if it has been actually demonstrated that the bacillus tuberculosis finds its way through our sewers into the lake and drinking water. We are not justified in saying that our water contains this element of danger until it has been demonstrated.

DR. J. ZEISLER asked if Dr. Gradle had examined the Waukesha waters and found bacteria in them.

DR. GRADLE closed the discussion by saying he took pains not to state in his paper whether he thought the disease germs found in the water were introduced by means of the sewerage or air. It is not a vital point so far as the use of the water is concerned, although if it is decided that these bacteria are introduced by means of the sewerage and not the atmosphere, it would have a bearing on the question of where to dispose of our sewerage. However, there is no doubt but bacteria are introduced into large bodies of water by means of dust, vegetation, and decayed leaves, and there is no reason to believe that the bacteria found in our water is derived from the sewerage alone. A Russian chemist had examined the water found at St. Petersburg, and found that at a distance from the city the number of bacteria per cubic centimetre was considerably less than near the city. Dr. Gradle has examined water obtained from Lake Michigan about thirty-five miles from Chicago and had found about the same number of bacteria per cubic centimetre, but a less number of varieties than in city water. He believed the spores of typhoid and tuberculosis may find entrance into our lake water and become causes of disease in individuals who are not prepared to resist their attack. Dr. Gradle had never examined the Waukesha waters, but he had examined water from a spring on his own farm, which he believed to be as pure as Waukesha water, and had found only fifteen to twenty bacteria per drop, and only three varieties. He believed that spring waters are the purest, as the bacteria they contain cannot be due to sewerage.

DR. W. H. LYFORD read a report of a case of

SCLERODERMA.

A girl, æt. 10 years, apparently healthy and of good family history. Five years ago she received a shock from a lightning stroke. Shortly afterwards her parents noticed, under the surface of the skin over the outer region of the left forearm, a delicately traced symmetrical figure, branching and ramifying in purplish colored lines with singular regularity. Dr. Lyford believed the lightning had paralyzed the cutaneous branches of the musculo-spiral nerve, and caused congestion of these filaments, with the marking as a result. In due course of time the skin has undergone the changes that take place in scleroderma. There is hyperæsthesia accompanied by pain, especially at night. The patch is also now slightly elevated above the surrounding healthy integument, and is only slightly movable, while at the elbow it is attached to the fascia and sheaths on the tendons, thus interfering somewhat with the movements of the forearm.

DR. J. ZEISLER said he had seen four cases of scleroderma, two of general scleroderma and two of partial scleroderma. The first two cases he saw in a clinic of Kaposi. Their appearance was striking. In scleroderma the features of the face are immobile, and therefore the patient cannot express the emotions. The skin and underlying tissues seem to grow together. The cases of partial scleroderma he had seen in this city. In one patient the patch of scleroderma was a ribbon-like band behind one ear, pinkish in color, immovable upon the underlying tissues. The other case was a lady æt. 50 years, who noticed her right mammary gland was becoming hard, large, and the nipple contracted. There was no pain in the breast nor were the axillary glands involved. The skin was hard and adherent to underlying tissue. A similar condition was observed in a patch of skin on the right arm. Kaposi states the majority of cases of scleroderma occur in females. The best treatment for scleroderma is massage and galvanic electricity.

DOMESTIC CORRESPONDENCE

LETTER FROM NEW YORK.

(FROM OUR OWN CORRESPONDENT.)

Cuneiform Osteotomy for Congenital Talipes Equinus—Compound Comminuted Fracture of the Femur—Cholecystotomy for Abscess of Gall-bladder and Closure of Cystic Duct.

At the last meeting of the New York Surgical Society the proceedings were of unusual interest and variety of scope. Dr. Charles T. Poore presented a patient, the subject of congenital talipes equinus, on whom he had performed cuneiform osteotomy with the most successful results. The operation, which consisted of the removal of a V-shaped piece from the outer aspect of the foot, as advocated by Davy and others, was not performed until after the failure of all attempts to change the position of the anterior portion of the foot, including the use on several occasions of Bradford's instrument for forcibly rectifying this deformity. The patient was observed to walk with but a slight limp, and Dr. Poore stated that he was regaining motion in the ankle-joint, while there was no pain whatever about the foot.

Dr. George A. Peters then presented a patient, a lad of 16, whom he had treated at St. Luke's Hospital for compound comminuted fracture of the femur. The injury was caused by being kicked and trampled upon by a horse, and about four and a half hours after it was received Dr. Peters operated as follows: The surface of the limb was thoroughly cleansed and rendered aseptic. An incision two and a half inches long was made on the external opening down to the bone. A large piece of the anterior surface of the shaft of the femur was then found to be chipped off; though attached at its lower end by the periosteum. This was removed, and found to measure six inches in length, by one inch in width. Another small loose piece was also found and removed. The two beveled surfaces of the femur were then united by two silver wires, after which the wires were twisted, and the ends left projecting from the external wound. A rubber drainage-tube was inserted, and the incision closed with a continuous catgut suture. The wound was well dusted with iodoform, and a dressing consisting of iodoform gauze, bichloride gauze, and a Lister bandage, applied. The foot was slightly everted, and a long Liston splint, reaching from the toes

to the thorax, bandaged on. Finally, Buck's extension, with a weight of five pounds, was ordered, and the patient placed in Ludlow's modification of Crosby's fracture-bed. More than seven months afterwards a piece of the lower fragment of bone, measuring two and a half inches by seven-eighths of an inch, was removed from the sinus left, and it was found to contain two of the drill-holes made by Dr. Peters. The patient was discharged, after remaining in the hospital for eight months, with good union and only about one inch of shortening. The good result in this case, Dr. Peters thought, was largely due to the fracture bed referred to, which is much used in St. Luke's.

The paper of the evening was by Dr. Joseph C. Hutchinson, of Brooklyn, and was entitled: *A Case of Closure of the Orifice of the Cystic Duct by a Gall Stone; Abscess of the Gall-bladder; Cholecystotomy; Recovery.* This was a very obscure case, and the diagnosis was not positively determined until laparotomy was resorted to. The history of the patient, whom Dr. Hutchinson saw in consultation with Dr. Bristow, of Brooklyn, was as follows:

Mrs. S., a widow, about 40 years of age, about twelve years before coming under his observation, began to have paroxysms of severe pain in the "pit of her stomach, running through to the back," coming on suddenly, and lasting usually about twenty minutes, but occasionally for an hour. There was sometimes an interval of a year or more between the paroxysms; then, again, they would come every day, and even several times a day. As a rule, she said, the paroxysms were more frequent when she was in ill health or became wearied by any unusual exertion. They were not attended by nausea and vomiting or febrile disturbance, and were not followed by jaundice. In July, 1884, when she first came under Dr. Bristow's care, a tumor about the size of a man's fist was discovered in the right side of the abdomen, below the level of the umbilicus. Pressure upon it produced a sense of oppression and shortness of breath, but no pain was developed. There was, most of the time, a dull aching sensation in the region of the tumor, and to get relief the patient would involuntarily apply the hand and move the tumor to one side or the other, which she could do for about two inches. At that time she had been free from the paroxysmal attacks of pain for about two years. She was anæmic, and complained of exhaustion; but was able to attend to her household duties. The bowels moved regularly, and the fæces were normal in color and consistency. There was no suspicion of hepatic disease. She had never had jaundice; chemical and microscopic examination of the urine showed that it was normal in all respects; and she did not have rigors or fever.

Dr. Hutchinson first examined the tumor in January, 1885. It then extended from a line on or level with the umbilicus, and an inch to the left of it, across to the right lumbar region, and downwards to within two inches of Poupart's ligament. It was irregularly rounded, fluctuated distinctly, was movable from side to side, and was painless. There was no dulness between the tumor and the liver. The uterus was normal in size.

The diagnosis was, cystic tumor of the ovary, and she was operated on, after an appropriate course of preparation, on May 18, 1885. After the patient had been placed under ether, Dr. Hutchinson made another careful examination of the tumor, and a question then arose as to the correctness of the diagnosis made. Under the circumstances, therefore, he made an exploratory incision through the *linea alba*, beginning one inch below the umbilicus, and extending it downward two and a half inches. When the abdominal cavity was opened the cyst, white in color, was brought into view, and a steel sound, first dipped in hot water, was passed in, and swept around the tumor, with the result of proving that there were no adhesions. With a large trocar one pint of laudable pus was then withdrawn from the sac, and microscopic examination subsequently showed that there were no cholesterine crystals, or other elements to indicate that the fluid came from the gall-bladder.

The cyst was seized with forceps and drawn up into the wound, in order to prevent its contents from escaping into the abdominal cavity. In manipulating the sac Dr. Hutchinson discovered that it contained a rounded solid body which, on being removed by the finger, after the opening made by the trocar had been enlarged, proved to be a gall-stone. On further exploration, another was found, pointed on one side; the point fitting into the orifice of the cystic duct, completely occluding it. This condition, he said, explained the absence of jaundice, of clay-colored stools, and of bile-pigment in the urine. An effort was made to explore the cystic duct with a probe; but its orifice could not be discovered. Two fingers were then carried along the collapsed gall-bladder to the under surface of the liver, to ascertain, if possible, whether the ducts were free from calculi or other obstructions; but none could be found. The sac was well irrigated with warm water, and the edges of the opening into it were stitched with five interrupted silk sutures to the upper end of the wound in the abdominal walls, leaving the opening into the gall-bladder quite free. The edges of the peritoneum were closed by a continuous catgut suture, and the remainder of the abdominal tissues by interrupted silk sutures, carbolized, carried down to the perineum, but not through it. The walls of the gall-bladder were one-fourth of an inch thick. A glass drainage-tube was introduced into the gall-bladder, and the wound was dressed with oiled lint, sprinkled with iodoform, and covered with marine lint and a bandage. The gall-bladder was irrigated daily for four or five days, through the drainage-tube, with a one-half per cent. solution of carbolic acid.

Bile began to flow from the drainage tube on the second day after the operation, and it continued to flow from the fistulous opening for six weeks, when the latter was entirely closed. After the operation the temperature once reached 101°, but it was promptly reduced to 99° by the application of the abdominal rubber coil. The patient was allowed to get up on the twenty-first day. Microscopic examination of the calculi removed showed them to be largely composed of cholesterine.

In some concluding remarks, Dr. Hutchison said

that an interesting feature of the case was the uncertainty of the diagnosis and the absence of symptoms calling attention to the gall bladder. The symptoms had been confined to paroxysmal pains in the epigastric or hepatic regions for nearly three years; while the pain which the patient had in the early history of the case, referred to the pit of the stomach and extending to the back, although irregularly paroxysmal was unattended by nausea and vomiting, and was not followed by jaundice or clay-colored stools, symptoms which were considered almost pathognomonic of the passage of biliary calculi. Aspiration, instead of throwing any light on the case, would have made the nature of the tumor still more uncertain, because none of the elements of bile would have been found in the fluid thus removed, which, as was shown at the time of the operation, would have consisted of pure pus. Acupuncture might have aided in the diagnosis; but in so large a collection of pus, it was not probable that the needle would have found the calculi.

Although cholescystotomy was unpremeditated in this case, Dr. Hutchison said that he would, in a similar operation, with the experience which this one had furnished, pursue the same plan. The incision in the *linea alba* is attended by less hemorrhage than the usual incision along the margin of the ribs, and experience has shown that an enlarged gall-bladder can be reached quite as readily by one incision as the other. Suturing the opening in the gall-bladder to the abdominal walls, and establishing a biliary fistula should, he thought, be preferred to sewing it up and leaving it in the abdominal cavity,—*first*, because there would be less danger of the escape of bile into the perineal cavity, and, *second*, if the cavity cannot be found at once, they may be searched for subsequently, or be spontaneously discharged through the fistulous opening, which usually heals in a few weeks, Dr. Hutchison last saw the patient January 25, 1886, when she felt well, and was greatly improved in appearance. This case afforded another illustration of the difficulty in always positively diagnosticating abdominal tumors, and of the importance of being prepared, before operating, for unexpected conditions.

Dr. T. M. Markoe, remarked that he now had a case which he was carefully watching with a view to operating It was quite different from Dr. Hutchison's, however, in the fact that the distended gall-bladder could be made out very clearly. He thought jaundice was rather the exception than the rule in these cases. P. B. P.

MISCELLANEOUS.

The Florida Medical Association will meet in Palatka, Putman Co., on Tuesday, May 18.

Medical Society of the State of California.—The sixteenth annual session of the Medical Society of the State of California, was held in San Francisco on the 21st, 22nd, and 23rd of April. The attendance was larger than that for many years. One hundred and forty-five new members were admitted. There was a marked increase in the number of voluntary papers.

The following officers were elected for the ensuing year: President, W. S. Thorne; First Vice-President, R. H. Plummer; Second Vice-President, W. F. McNutt; Third Vice-President, A. G. Anthony; Fifth Vice President, W. R. Cluness; Treasurer, G. C. Simmons; Secretary, W. A. Briggs; Assistant Secretaries, J. H. Parkinson and L. M. F. Wanzer; Board of Censors—William Watt Kerr, T. B. DeWitt, H. S. Orme, A. G. Anthony, G. G. Tyrrell; Board of Examiners—James Simpson, R. H. Plummer, C. G. Kenyon, C. H. Steele, C. E. Blake, W. F. McNutt and William M. Lawlor.

The next session will be held in San Francisco, commencing on the third Wednesday in April, 1887.

Illinois State Medical Society.—The annual meeting of the Illinois State Medical Society will be held in Washington Hall, Bloomington, on May 18, 19 and 20, beginning at 11 A.M., on Tuesday, May 18.

The Railway fare for delegates and members from Chicago is $5.00 for the round-trip. Delegates from other States will pay full fare coming and one cent a mile returning.

Arrangements have been made for commutation fare at the Ashley House, Phœnix Hotel and Hotel Roberts, each within one or two squares of Washington Hall.

Trains leave Chicago as follows: Illinois Central 2:50 P.M., arriving in Bloomington 9 P.M. Chicago and Alton, 8:45 A.M., 12:30 P.M., and 11:20 P.M., (with sleeper) arriving at Bloomington at 1:40 and 5:40 P.M., and 6:30 A.M.

Hydrophobia in Russia.—In the *Russkaia Meditzina*, No. 8, 1886, p. 141, Dr. A. Bürtzeff, of Totma, Valogda Government, writes that, on November 22, 1885, seven adult men were bitten by a rabid wolf, which rapidly visited different parts of the town, and then escaped. All the patients were immediately attended to at the local hospital, their wounds being washed out with a strong solution of carbolic acid, energetically cauterized with caustic potash in substance; in addition, ligatures, lotion of caustic potash, and chloral hydrate in scruple-doses internally were used. In three of the patients, hydrophobia appeared on the thirty-fourth, thirty-sixth, and thirty-eighth days; the cases ending fatally in thirty-seven and a half, seventy-one, and sixty-five hours. Subcutaneous injection of curare did not give the slightest relief to any of the patients. According to Dr. Bürtzeff, the symptoms and course of the disease closely tallied with those described by Dr. Bristow; that is, there were present intense pain in the wounds; general hyperæsthesia; violent dyspnœa of the muscles of deglutition and respiration; thirst, with inability of swallowing either solids or fluids; affective insanity etc. In two of the patients, a tendency to bite everybody, and to gnaw everything within their reach, was observed. The remaining four patients bitten are still in good health. In conclusion, the author lodges

a complaint against the freedom with which wolves, rabid and healthy alike, are allowed to run and ramble about the town, no measures to prevent this being taken by the authorities. Probably, the latter will be aroused when a sagacious wolf bites or devours one of their number. Till then, the wolves will remain unmolested, and privileged in their possession of freedom.—*British Medical Journal*, April 24, 1886.

DR. EDWARD F. WELLS, formerly of Minster, Ohio, has accepted the Chair of Materia Medica, Pharmacology and Clinical Medicine in the College of Physicians and Surgeons of this City, and has removed from Minster to 148 Dearborn Ave., Chicago.

THE PASTEUR COMMISSION.—The Commission of Inquiry into the system carried out by M. Pasteur to prevent the development of hydrophobia, which has been appointed by the British Government, has now commenced its investigation. The Commission consists of Sir H. Roscoe, M.P., who moved for the appointment of the Commission in the House of Commons, Sir James Paget, F.R.S., Dr. Burden Sanderson, F.R.S., Dr. Quain, F.R.S., Principal Veterinary Surgeon G. Fleming, of the Army Veterinary Department, Dr. Lauder Brunton, and Mr. Victor Horsley, F.R.C.S., of the Brown Institute, the latter acting as Secretary to the Commission. Sir H. Roscoe, Drs. Brunton and Sanderson, and Mr. Horsley are now in Paris, and before long the public may look forward to the issue of a report which will enable them to appreciate the value which properly attaches to the processes adopted by M. Pasteur. The composition of the Commission renders it quite unnecessary to indicate the nature of the evidence which should be sought for; but we may say that, so far, no reports which have come under our notice have given sufficient evidence that their compilers have eliminated the many sources of error which have to be dealt with before any trustworthy opinion can be expressed as to the methods carried out in Paris.—*Lancet*, May 1, 1886.

THE PROGRESS OF BEER-DRINKING IN AMERICA.—Beer, it would seem, is rapidly replacing the fantastic "drinks" for which the United States have earned a reputation, and is in a fair way to become the national beverage. The quantity of beer now consumed is, in proportion to the population, eleven times as great as it was forty years ago. Some, perhaps not altogether disinterested, persons appear anxious to get up a scare about beer; and are endeavoring to prove that it is a beverage peculiarly dangerous to health, causing degeneration of the heart, the liver, and the kidneys. The evidence, however, in support of this charge is not overwhelming; it is said, for instance, that the hearts of the men of Munich are larger than those of other people, and more ready to undergo fatty degeneration; and that the number of people who die of Bright's disease, in New York, has increased since beer became a popular beverage. Evil tales are told of its adulteration, but they have not found much confirmation in the analyses made for the State Board of Health; and there is reason to fear that even whisky is sometimes tampered with. On the whole, this change in the drinking habits is a matter for congratulation; even if it be true that he who drinks beer thinks beer. Still, our somewhat mercurial cousins may be none the worse for the infusion of a little Teutonic solidity. There is, however, one kind of ale which is best of all—that of Adam.—*Brit. Med. Jour.*, May 1, 1886.

AMERICAN MEDICAL ASSOCIATION.—The Thirty-eighth Annual Meeting of the American Medical Association will be held in Chicago, commencing on the first Tuesday in June, 1887, under the Presidency of Dr. E. H. Gregory, of St. Louis. Much of the success of the St. Louis meeting is due to the efficient work of Dr. LeGrand Attwood, Chairman of the Committee of Arrangements. The Chairman of this Committee for 1887 is Dr. Chas. Gilman Smith, and it may be predicted that he will prove a most fitting successor to Dr. Attwood.

The social features of the St. Louis meeting were of the most brilliant description. With a musical entertainment at the Exposition Building on Tuesday evening, a grand reception at the Merchants' Exchange on Wednesday, six receptions at private houses on Thursday evening, and an excursion on the "Chouteau," one of the largest steamers on the Mississippi, on Friday afternoon, the members and delegates actually labored under embarrassment of social riches. The St. Louis meeting will long be remembered as one of the most pleasant in the history of the Association.

SPANISH RAGS.—The prohibition of the importation into England of rags from Spain has been extended for a period of four months from May 1.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM MAY 1, 1886, TO MAY 7, 1886.

Major Francis L. Town, Surgeon, granted leave of absence for eight months, with permission to go beyond sea, to take effect when his services can be spared by his department commander. (S. O. 101, A. G O., April 30, 1886.)

Capt. Wm. J. Wilson, Asst. Surgeon, died May 2, 1886, at Plattsburg Bks., N. Y.

First Lieut. Geo. F. Wilson, Asst. Surgeon, ordered for duty at Ft. Shaw, M.T. (S. O. 37, Dept. Dakota, April 26, 1886.

First Lieut. A. S. Polhemus, Asst. Surgeon, relieved from duty at Presidio of San Francisco, Cal., and ordered for duty as Post Surgeon, Ft. Halleck, Nev. (S. O. 28, Dept. Cal., April 26, 1886.)

OFFICIAL LIST OF CHANGES IN THE MEDICAL CORPS OF THE U. S. NAVY, DURING THE WEEK ENDING MAY 8, 1886.

Kite, Isaac, Assistant Surgeon, ordered to Naval Hospital, Brooklyn.

Simon, W. J., P. A. Surgeon, ordered for temporary duty to the Naval Academy, Annapolis.

Lippincott, Geo. C., P. A. Surgeon, ordered for temporary duty to the Naval Academy, Annapolis.

OFFICIAL LIST OF CHANGES OF STATIONS AND DUTIES OF MEDICAL OFFICERS OF THE U. S. MARINE HOSPITAL SERVICE FOR THE WEEK ENDED MAY 1, 1886.

Magruder, G. M., Asst. Surgeon, appointed an Asst. Surgeon April 24, 1886. Assigned to temporary duty at Norfolk, Va., April 26, 1886.

CORRIGENDUM.

On page 551, this issue of THE JOURNAL, first column, second line, for "thrombolic" read "*thrombotic.*"